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ABSTRACT

This instructor's guide accompanies the self-paced student training modules on drywall, one of which is available separately as CE 032 887. Introductory materials include a description of the components of the pre-apprenticeship project, a discussion of the teacher's role in conducting the course, and scope and content of the four phases of training. The guide contains 13 units organized according to this format: title; instructional outcomes; introduction; and presentation, including a teaching outline of the unit and teaching methods and aids referenced to student modules. Job sheets and drawings are provided as needed. Topics covered in the units include the following: introduction to the drywall trade, diagnostic testing, survival skills, trade mathematics, physical requirements, safety, first aid, blueprint reading, trade tools, equipment, trade materials, tasks, and a drywall project. (KC)

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INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP

PHASE 1 TRAINING
Instructor's Guide

Drywall

Diagnostic Tests
Survival Skills
Math
Tools
Materials
Project

000183

CE 032 886

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INTRODUCTION TO PRE-APPRENTICESHIP

DESCRIPTION OF APPRENTICESHIP

The Federal Bureau of Apprenticeship identifies an apprenticeable occupation as a skilled occupation that requires a minimum of one year of 2000 hours on-the-job training. This on-the-job training and related educational training is the apprenticeable period.

VIEWPOINTS ABOUT PRE-APPRENTICESHIP

Pre-apprenticeship is viewed in many different ways by craftpersons, apprenticeship committees, educators and the general public.

Concerns about pre-apprenticeship include the belief that the pre-apprenticeship training will flood the market with applicants for apprenticeship or that these trainees will go to work in the occupation as partly trained workers or that pre-apprenticeship would be considered a guarantee of entry into apprenticeship. These conflicting viewpoints create problems for persons interested in apprenticeship training and make it difficult to operate pre-apprenticeship training programs.

NEED FOR PRE-APPRENTICESHIP

Pre-apprenticeship provides three benefits:

1. Provides a screening device to determine motivation, interest, manipulative aptitude and ability of persons to learn the skills of the occupation.
2. Provides the individual with survival skills for handling personal problems and interpersonal relations on the job that may include abuse and sexual harrassment.
3. Provides entry level skills to help make the apprentice productive from the first day on the job. The higher entry level skills of the apprentice provides an incentive for the employer to hire apprentices.

PRE-APPRENTICESHIP HELPS PEOPLE

To select a skilled occupation.
To identify the educational requirements of an occupation.
To experience the hands-on skills of an occupation.
To develop good work habits.

* Good job attendance
* Punctuality
* Dependability
* Time management

To develop good attitudes.

* Concern for the job
* Initiative
* Interest
* Healthy, cooperative working relations with fellow employees.

TRAINING LEVELS FOR PRE-APPRENTICESHIP

Pre-apprenticeship training can be separated into three phases or stages of training. These are:

PHASE 1

Provides the trainee with an opportunity to explore several occupations. This orientation to the plumbing trade includes training in trade terminology, blueprint reading, tool usage, first aid and safety practices. This familiarization training includes hands-on experience in some of the basic skill areas together with information about the advantages and requirements of plumbing. The choice of an occupation to train for in Phase 2 of pre-apprenticeship will be based on these experiences. If the trainee decides not to pursue this occupation any further, the training received to this point will be useful in every day life.

Phase 1 includes diagnostic tests to determine if reading or mathematical deficiencies exist that would handicap a person in the plumbing trade. Remedial work will be provided to correct these deficiencies.

Success on the job is directly related to job attitudes, work habits, and the individual survival and coping skills. Training will begin on helping each individual attain full potential in these personal skills.

Interpersonal skills will be developed which include:

* Communication skills
  - paraphrasing, perception checks, non-verbal communication
  - communicating with superiors
* Personal effectiveness
  - problem solving, family relationships, sexual harrassment and pestering on the job.
* Interview techniques
  - apprenticeship committee interview procedure

PHASE 2

This training begins the serious preparation for an occupation. The training related to job attitudes, work habits and individual survival and coping skills will be continued from Phase 1 with more emphasis on the relationship to the job.

Manipulative skills will be developed by the completion of a series of projects involving basic trade skills which have a carryover benefit to persons outside of the occupation. At least 3/4 of the training will consist of hands-on experiences. This instruction should be conducted by a skilled craftsperson from the trade or occupation who has the necessary teaching skills.

The joint apprenticeship committee for the occupation will be invited to observe the progress of trainees during Phase 2 and to evaluate the potential for trainees for entry into apprenticeship. The participation of the appropriate joint apprenticeship committee is essential to the success of a pre-apprenticeship program. This community involvement insures that the training is relevant to the occupation and meets industry training standards.

At the completion of Phase 2 the trainee will have enough experience with the occupation to decide whether to continue with the training into Phase 3. The joint apprenticeship committee will have knowledge of the quality of the training program and will be in a position to judge the qualifications of the students for entry into the apprenticeship training program.

PHASE 3

Training is concentrated on improvement of manipulative skills so that the trainee will be a productive employee the first day on the job. This training can be either industry conducted specialized training, secondary school vocational programs or community college preparatory courses specifically related to the occupation. Trainees can also participate in co-op work experience involving hands-on training at the secondary or community college level. Hands-on training is considered essential for an effective pretraining program.

The Phase 3 training period provides the trainee with an opportunity to search for an employer willing to take an apprentice. Frequently the employer providing co-op work experience training will hire the trainee as a regular employee.

It is possible that some employers will hire the trainee without further training. Some of these employers train specifically for their own needs. In the process, job descriptions have become highly diluted. Instead of producing journeymen possessing a wide range of skills, companies have settled for specialists trained to perform the specific tasks needed in certain narrow operations. While this may be adequate to meet the special needs of an industry, it certainly will not meet the training and manpower needs of the nation in the future.

Apprenticeship provides a broad base of training by giving the apprentice a wide range of skills which insures continuous employment. Workers least vulnerable to unemployment are those with the highest and broadest skills and best training. The trainee should make every effort to enter an apprenticeship training program designed to provide training in all skills required

in the trade or go to work for an employer who will provide broad based training.

Each trainee will choose a joint apprenticeship committee meeting to attend during Phase 3 training. This will provide an opportunity for the trainee to become acquainted with members of the joint apprenticeship committee and to see how the committee functions.

PHASE 4 EMPLOYMENT AS AN APPRENTICE

Trainee enters apprenticeship training on a direct referral basis under agreement with the appropriate joint apprentice committee which permits persons trained in programs financed with federal funds to enter apprenticeship on direct referral. Direct referral eliminates several of the procedures in the selection process and makes entry into apprenticeship less cumbersome.

Not all joint apprenticeship committees use the direct referral system. This is the reason why sponsors of pre-apprenticeship training should directly involve joint apprenticeship committees in the operation of their programs. This provides committees with an opportunity to evaluate the effectiveness of pre-apprenticeship.

The federal Job Corps Programs enjoy direct referral placement in apprenticeship for their graduates. The Job Corps operates an ideal pre-apprenticeship program. Proposed sponsors of pre-apprenticeship training are advised to visit the nearest Job Corps Center to see how the programs operate.

The Job Corps Centers in Oregon are located at:

Angel Job Corps
Star Route North
Yachats, OR 97498
547-3137

Timber Lake Job Corps
Star Route Box 109
Estacada, OR 97023
834-2291

Wolf Creek Conservation Center
Little River Route
Glide, OR 97443
496-3507

Tongue Point Job Corps
Astoria, OR 97103
325-2131

Job Corps Centers in Oregon Offer Training in these apprenticeable occupations:

Carpentry
Cement Mason
Brick Laying
Plastering
Tile Setting
Automotive
Painting

RECOMMENDED PROCEDURE FOR CONDUCTING PRE-APPRENTICESHIP TRAINING

ADMINISTRATION

Pre-apprenticeship training can be conducted by various sponsors. These include: secondary schools, community colleges, unions, employer associations, labor/management training trusts and private groups such as O.I.Cs.

ADVISORY COMMITTEES

Use of broad-based community advisory committees is mandatory for pre-apprenticeship programs conducted by secondary schools and community colleges. Pre-apprenticeship needs the support and recognition of the community in order to be successful.

The advisory committee should have representatives from these groups:

School administration
- -high school principal
- -board members
- -vocational director
- -co-op work experience
- -T & I instructors

Community
- -school graduate in trade
- -member of joint apprenticeship committee
- -employer member of trade
- -employee member of trade
- -union business agent
- -industry training coordinator
- -representative of financial community
- -representative of press

Government personnel
- -ESD regional vocational coordinator
- -Oregon Division of Apprenticeship field representative
- -Federal Bureau of Apprenticeship representative
- -State Dept. of Education specialist

FINANCING

Vocational training programs generally cost more than academic programs because the student/teacher ratio is smaller, consumable supplies are required, and expensive equipment is needed. Resources to finance pre-apprenticeship training are available from a number of sources. These include:

Vocational rehabilitation	-tuition fees
Federal funds for immigrants	-Asian -Cuban -Spanish American
Special grants	-U.S. Dept. of Labor U.S. Dept. of Education CETA Industry State Dept. of Education Economic Development Administration
Secondary school funding	-basic school grant from federal funds
Community college funding	-basic state funding

INSTRUCTIONAL DELIVERY SYSTEMS

The type of sponsor for pre-apprenticeship training will determine the time-block used for the program. If training is started at the 9th grade level, a two-hour training period will generally be used. A half-day training period should be used for an accelerated program at the secondary level covering two years. Community college programs can be either half-day or full-day programs. Private sponsors generally will operate on a full-day basis.

Instructors for the trade specific training should be qualified craft workers. These may be employed on a part-time basis, or full-time, serving several programs. The necessity for skilled workers to teach the trade specific items of the program

cannot be over-emphasized. The work experience of skilled craft workers gives them the insight into the occupation needed for effective teaching.

MANIPULATIVE SKILL TRAINING

The manipulative skills or hands-on experiences provide the basis for a sound and effective pre-apprenticeship training program. Unless this training is available the program will not succeed.

Important considerations involve the following items:

Basic tools	-tools required for each participant
General or shop tools	-power tools (purchased or rented)
Materials	-purchased by training agency -purchased by others (training project sponsor) -donations by industry (defective goods)
Training facilities	-school based -community based
Training projects	-school maintenance work -simulated projects -community projects -private projects (non-profit organizations-low income persons)

COORDINATION WITH EXISTING PROGRAMS

Pre-apprenticeship should be coordinated with related programs in secondary schools and community colleges.

Welding	Electronics
Blueprint reading/drafting	Industrial mechanics cluster
Surveying	Construction cluster
Automotive	Electricity/electronics cluster

MISCELLANEOUS CONSIDERATIONS

Legislation, community support and political considerations will all have an effect on pre-apprenticeship training. Activities related to these concerns include:

Workshops and technical assistance	-State Dept. of Education
Publicity notices	-public service -newspaper -radio -translation to Asian/Spanish American
Civil rights	-effect of civil rights compliance
Transfer of learning	-benefits of vocational training to other occupational endeavors

COURSE OUTLINE

1.0 Introduction to the Drywall Trade

- 1.1 History
- 1.2 Trends
- 1.3 Working Environment
- 1.4 Employment Practices
- 1.5 Employment Outlook
- 1.6 Wages
- 1.7 Worker Benefits
- 1.8 Trade Terminology

2.0 Diagnostic Testing

- 2.1 SATB

3.0 Survival Skills

- 3.1 Expectations
- 3.2 Communication Skills
- 3.3 Giving and Receiving Feedback
- 3.4 Dealing with Interpersonal Conflict
- 3.5 Group Problem Solving, Goal Setting and Decision Making
- 3.6 Wider Influences and Responsibilities
- 3.7 Identifying and Developing Individual Strengths
- 3.8 Worksite Visits
- 3.9 Resumes
- 3.10 Interviews
- 3.11 Appropriate Work Habits and Attitudes

4.0 Trade Math

- 4.1 Math Diagnosis
- 4.2 Math Remedial

5.0 Physical Requirements

- 5.1 Physical Requirements
- 5.2 Developmental Processes

6.0 Safety

- 6.1 General Safety
- 6.2 Personal Safety
- 6.3 Fire Types and Prevention
- 6.4 Hygiene Safety
- 6.5 Hand Tool Safety
- 6.6 Power Tools

7.0 First Aid

7.1 First Aid

8.0 Blueprint Reading

8.1 Scaling and Dimensioning
8.2 Sketching
8.3 Drawing Types and Views

9.0 Trade Tools

9.1 General Tools

10.0 Equipment

10.1 Drywall Equipment

11.0 Trade Materials

11.1 General Materials
11.2 Fasteners
11.3 Sheet Metal Fabrications
11.4 Insulation and Other Sheet Metal
11.5 Sealants and Adhesives
11.6 Suspension Metal

12.0 Tasks

12.1 General Tasks

13.0 Project

II. WORD TO THE INSTRUCTOR

This course was designed to be a trade-related, self-screening, job exploration package, providing the student with basic trade theory, basic trade manipulative practice, projects and on-job-site visitations.

Further, it is to be implemented by instructors who are skilled in each of the general topics described in the course outline and expanded on in the instructor's guide.

The curriculum is comprised of two parts: 1) the instructor's guide, and 2) supporting modules and references which are specified in the instructor's guide. The instructor should seek other supporting resources where available or necessary.

The instructor should bear in mind that there are two broad objectives written into the design of this course: 1) that the student will receive instruction in the preapprenticeship mode of the trade (which is designed to enable him or her to gain enough exposure to the trade to (a) aid in making a career decision, and (b) facilitate entry into the trade), and 2) that the student will retain some carryover skills which he or she can use in life, even should the student decide not to enter the trade.

Essentially, this guide is patterned after a program begun in Oregon in 1979-80. The participants in the program are wholly CETA-sponsored, many with motivational or physical impairments. The program concentrates on providing motivational support and/or physical therapy. A typical program, broken down into its major components, would be:

40% hands-on, manipulative work
30% motivational support work
10% job visitation
5% physical development or therapy
15% class lecture, discussion, etc.

1.0 Introduction to the Drywall Trade

INSTRUCTIONAL OUTCOMES: The student will be able to identify and explain briefly the history, trends, working environment, employment practices and outlook of the trade, as well as working people's benefits and trade terminology.

INTRODUCTION: In order to become an effective worker or make an effective work or career decision, an individual must be exposed to various aspects of the trade.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
1.1 History A. Wallboard invented in late 1880s B. 1920s and 1930s 1. Ivory paper replaced old covering paper. 2. Paper fibers added to core material. 3. Tapered board edges. 1.2 Trends A. Drywall has revolutionized construction industry in last two decades.	Explain and Discuss ILS Introduction to the Drywall Trade

B. 89 percent of new residential construction uses drywall 1. Provides sound control. 2. Provides fire resistance.	
1.3 Working Environment A. Strenuous Work 1. Stooping, kneeling. 2. Lifting and maneuvering heavy panels.	Jobsite Visitation Invite Job Specialist
1.4 Employment Practices A. Employers prefer high school graduates 1. Good physical condition. 2. Background in carpentry and math. B. Workers usually begin as helpers C. In 1978 some 82,000 persons worked as installers and finishers D. Most of work in urban areas E. Not as seasonal since done indoors	
1.5 Employment Outlook A. Expected to steadily increase in 1980s B. Will depend on construction starts	
1.6 Wage Scale A. In 1978, U.S. average pay about $10/hr.	

1. Has increased since. 2. Beginners start at about half.	
1.7 Common Worker Benefits A. Unemployment Insurance 1. Purpose. a. transition from job to job. b. ease strain of layoffs. 2. Source of benefits. a. payroll tax on wages. 3. Eligibility. a. depends on base year earnings. b. depends on reasons for leaving work. 4. Level of benefits. a. level of base year earnings. 5. Claims process. a. report to Employment Division office. b. provide required information. (1) employer's name and address. (2) your social security number. (3) wage earning records. (4) current address. 6. Appeals/hearing process. a. initiated by worker. b. in writing. c. within time limits.	Explain and Discuss ILS Common Worker Benefits Invite Field Rep Workmen's Compensation Board BOL Wage and Hour Employment Division
B. Wage and Hour Commission 1. Purpose. a. to investigate and attempt equitable settlement of wage claims.	

2. Areas of claim review.
   a. pay periods.
   b. pay days.
   c. final pay days.
   d. wage payments in cases of dispute.
   e. methods of compensation and overtime.
   f. minimum wage laws.
   g. limitation of hours in certain industries.
   h. restrictions on employment of minors.
3. Jurisdiction.
   a. Federal vs. State.
4. Claim Process.
   a. contact wage and hour commission.
   b. provide required information on appropriate form.
      (1) dates of employment.
      (2) rate of pay.
      (3) reason for non-payment.
      (4) estimate of disputed amount.
   c. wage claim conference.
   d. collection process.
   e. protection against retaliation for filing a claim.
5. Time limits for filing.
   a. regular pay.
   b. overtime pay.

C. Workers Compensation
   1. Purpose
      a. provide medical care payment for on-the-job accidents.
      b. provide time loss payments.

c. provide payments for permanent disability.

d. provide death benefits.

2. Source of benefits.

a. employer premiums for insurance.

b. employee contributions.

3. Level of benefits.

a. complete for medical costs.

b. varies according to level of final disability.

4. Eligibility.

a. any job-related accident or condition causing the worker to leave work and seek medical treatment.

5. Claim process.

a. report accident to employer.

b. fill out claim form.

(1) know your employer's legal name.

(2) know your employer's insurance carrier.

c. see your doctor for treatment.

6. Final determination.

a. doctor's statement of stabilized condition.

b. board's findings of disability and payment.

7. Reopening claim for aggravation of injury without a new injury.

a. contact employer's insurance company if occurs within the first five years.

b. contact worker's compensation board after five years.

1.8 Trade Terminology

A. Common Trade Terms

1. T-square (4')--metal tool used to mark accurate perpendicular lines across drywall sheets for cutting.
2. Utility knife--hand-held metal knife with replaceable straight edged blades used to cut/score drywall sheets.
3. Spirit level--wood or metal tool with calibrated vials used to check level and plumb.
4. Circle cutter--drill attachment used to cut circular holes.
5. Taping knives--hand-held tool with flat metal blade of varying widths.
6. Walk-up--folding sawhorse platform with adjustable legs.
7. Scissors lift--device for lifting materials/supplies to elevations above floor level.
8. Power screwdriver--drill type tool used to drive fasteners.
9. Powder tool--"gun" used to drive fasteners/anchors with gunpowder charge.
10. Pop rivets--metal rivets applied with squeeze gun to assemble metal fabrications.
11. Joint compound--prepared mixture used in taping joints when finishing drywall.
12. Insulation--material used to control sound and temperature travel through walls and ceilings.

13. "R" factor--rating system for level of temperature protection offered by insulation.
14. Fastener--materials used to attach/ connect materials such as nails and screws.
15. Resilient channel--fabricated material used to provide sound isolation in ceilings/walls.
16. T-channel--metal fabrication used to make suspended grid for ceilings.
17. Track (floor and ceiling)--metal fabrications used as base and top for walls and partitions.
18. Sheetrock (gypsum board)--basic sheet covering made of gypsum with paper facing.
19. Adhesive--materials used to attach drywall material to furring or framing.
20. Layout--trasferring location and measurements to jobsite from plans.
21. Furring--providing nailing surface for drywall over masonry.
22. Crimping--process of preparing reinforced corner joint for application of joint compound.
23. Framing--assembly of walls and partitions.
24. Fire rating--measurement of drywall resistance to fire measured in hours.
25. Butt joint--flush edge to edge joining of materials.

2.0 Diagnostic Testing/Dry Wall/Plasterer

INSTRUCTIONAL OUTCOMES: The Student will complete a Specific Aptitude Test Battery (SATB), administered by a qualified examiner and will have the results explained by a qualified examiner.

INTRODUCTION: The General Aptitude Test Battery is a standardized test that has become recognized as the best validated multiple test battery in existance for use in vocational guidance. The tests are used by apprenticeship committees to assist in the screening process for appropriate candidates when apprenticeship openings occur, and to provide individuals with an indication of the probability of their being successful in a particular trade.

Many apprenticeship programs require applicants to have certain aptitudes as demonstrated by passing appropriate tests. For example, the applicant may be required to pass Specific Aptitude Test Battery (SATB) administered by the State Job Service. SATBs test two or more of the following nine general aptitudes: general learning ability (cognitive functioning), verbal aptitude, numerical aptitude, spatial aptitude, form perception (ability to perceive small detail), clerical perception (ability to distinguish pertinent detail), motor coordination, finger dexterity and manual dexterity.

Each battery tests different combinations of these nine general aptitudes because each occupation requires different specific abilities. The following SATB tests and cutting scores are required by the apprenticeship committee for the trade. The student should be aware of the trade requirements and determine how he or she feels about his or her abilities in the tested aptitudes in order to make a career decision.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
2.1 SATB A. Complete exam described below: KEY: Trade Occupation Code # for the occupation SATB for the trade = Recommended cutting	

score for the trade
Location of the SATB within the GATB

DRY WALL/PLASTERER S#240
Numerical Aptitude = 80
Arithmetic Reason; Book II, Part 6
Computation; Book I, Part 3

Form Perception = 85
Tool Matching; Book II, Part 5
Form Matching; Book II, Part 7

Manual Dexterity = 100
#9 Place, #10 Turn, Board

	Cutting Scores		
	Adult	Grade 10	Grade 9
Numerical Aptitude	85	80	79
Spatial Aptitude	95	94	91
Finger Dexterity	80	75	72

B. Discuss Results:

3.0 Survival Skills/Drywall

INSTRUCTIONAL OUTCOMES: The student will learn and practice fundamental concepts in: a) dealing with expectations, b) communication skills, c) giving and receiving feedback, d) dealing with interpersonal conflict, e) group problem-solving, goal-setting and decision-making, f) outside influences and responsibilities, g) identifying individual strengths, h) appropriate work habits and attitudes, and, i) phases of job search and worklife.

INTRODUCTION: Training and proficiency in human relations skills are essential for successful adaptation to worklife. All too often in job preparation programs, these basic survival skills are neglected or put aside in favor of training in the technical aspects of work.

This topic describes the many skills necessary to become a stable, productive and satisfied worker.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
3.1 Expectations A. Predicting the future 1. Self-fulfilling prophecies a. setting yourself up for failure b. thinking positively	ILS Survival Skills-Expectations PREPARATION Be familiar with the material beforehand, and think up some relevant examples AVAILABILITY Be available to students. Go around those students reading the material. Be prepared to answer and ask questions that increase students' understanding.

	ELICIT RESPONSE Ask individuals what they would like to do most of all. Use their reply even if it seems trite. Suggest two alternative possibilities--the worst and the best. Ask how each would affect that student's feelings and behavior at this moment.
B. Two-step process to opening up expectations. 1. Being idealistic and realistic a. being creative and having ideas	RELEVANT COMPARISONS Illustrate creativity from movies, TV or writing. Tell the beginning of a story and ask for suggestions on how it might end. Give the original writer's version. Show how anything is allowed in creative ideas. Suggest students read court reports or news coverage.
b. keeping close to the facts	
c. effects of leaving out one of the two steps.	STUDENTS' EXAMPLES Encourage extreme examples of fantasy and of sticking close to the facts.
d. combining the two	
C. Prejudice about other groups.	EXAMPLES OF PREJUDICE Show how stereotypes arise out of stereotyped expectations.
D. Being a winner	ROLE MODEL Be heard thinking positively. Encourage positive thinking in students.

E. Self-Assessment--looking at common personal expectations F. Post Assessment	IDENTIFY PROBLEM AREAS Go through questions to see where students are putting themselves down. Give encouragement. Ask what they want to change. EXPLAIN Read through examples, answer questions. FLEXIBILITY Allow students to demonstrate their understanding in less than suggested number of situations.
3.2 Communication Skills A. Good communication 1. two-way process 2. importance 3. innate abilities 4. showing mutual respect B. Active listening. 1. Centering attention on the other person. a. being seen to be listening b. finding out what is important to the other person c. following the other person's lead d. listening to feeling 2. Checking that you have understood what the other person is communicating. a. checking feeling	ILS Survival Skills-Communication Skills. PREPARATION Be familiar with the material. BEING A ROLE MODEL Demonstrate active listening. Ensure that students voice problems and doubts. Allow frequent opportunity for students to give responses to on-going work. Be ready to demonstrate bad examples of listening, to group or individuals, and contrast with good examples.

b. checking content
c. when it is inappropriate

C. Being listened to.
1. Your rights as an individual
2. When to keep quiet
3. Avoiding being aggressive
4. A three-step approach
a. showing you understand
b. taking responsibility for your own feelings
c. suggesting alternatives

D. Overall importance of respect for individuals
1. Communication between equals

E. Self-Assessment
1. How individuals communicate with others

F. Practicing the skills in triads
1. Active listener of personal experience
2. Role play being listened to

ASSERTIVENESS

Draw examples from books on being assertive. Think up appropriate examples in work context. Discuss aggressive responses with individuals. Describe alternative approaches. Discuss possible exceptions--where aggression might be appropriate.

INSTRUCTOR/STUDENT RELATIONS

Assess relations in class in terms of respect for, and equality of, individuals. Ask students for comments.

IDENTIFY PROBLEM AREAS

Give help and encouragement. Find out from students what skills they want to practice.

TRIADS

Form triads (trios) as students finish Self Assessment.

FEEDBACK

Listen to one example of active listening in each triad. Give suggestions for improvement. Be open to alternative situations for the role play. Ensure students are willing to practice being sensitive to possible reluctance and shyness. Be prepared to role play yourself.

3.3 Giving and receiving feedback A. Importance of being able to give praise and criticism (introduction). B. Importance of group support and teamwork 1. Being a team member 2. Building a team a. knowing where you are b. pulling your weight c. responsibilities for others d. group aims and goals 3. Poor working environments a. indirect communication b. not knowing where you stand C. Reading attitudes 1. Hired or fired? 2. How do you come across to other people? 3. Interpreting other people's behavior D. Giving and receiving positive opinions 1. Importance of praise 2. Taking compliments 3. Giving praise E. Getting and giving criticism 1. Its importance 2. Being criticized 3. Avoiding being threatened 4. Between equals F. Self Assessment-Feelings and Preferences	ILS Survival Skills-Giving and Receiving Feedback PREPARATION Be familiar with the material and prepared to participate actively and equally. FACILITATION Facilitate continuously the building of group support. Give extra support to students who have difficulties participating fully. Enlist help of more confident and verbal to share the responsibility. Give support, but principally be a neutral chairperson or facilitator. Encourage group members to observe each others' non-verbal behavior between class times. POSITIVE REINFORCEMENT Give frequent verbal praise to individuals who are working well and to the group as it becomes more supportive MONITORING Walk around and ask permission to join in some partner discussions. Encourage greater depth. Avoid any judgments. Use paraphrase

	and feeling as checking skills.
G. Assignments 1. Telling individuals what you like	A DEVELOPING PROCESS Introduce when group is ready. First three assignments could be practiced even before module has been read. Explain, in turn each assignment to whole group. Deal with worries, doubts or questions before you begin.
2. Reading attitudes within the group. 3. Opening self-sharing important experiences	Use all your facilitating skills. Especially be sensitive to members' non-verbal responses. Follow up, after the class, on any individual who is upset. At all times encourage positive support within the group. Be prepared to intervene if criticism becomes too negative.
4. Receiving direct positive feedback 5. Receiving direct positive and negative feedback	
H. Post Assessment	Organize small groups or lead discussion of whole group. Use small groups to extend each individual's range of interactions.
3.4 Dealing with interpersonal conflict	ILS Survival Skills-Dealing with Interpersonal Conflict
A. Consequences of poor interpersonal relations	PREPARATION Be familiar with the material and ready to supply further relevant examples from the

B. Recognizing conflict in a work context
   1. Open arguments
   2. Possible causes
   3. Consequences
C. Them and Us atmosphere
   1. The conditions you deserve
   2. Whose responsibility?

D. Unproductive ways of solving conflict
   1. Finding someone to blame
E. Productive ways of solving conflict
   1. Taking responsibility for doing something about it
      a. when people feel threatened by you
      b. when you feel threatened

F. Remaining passive.
   1. Poor working conditions
   2. Physiological and psychological problems
   3. Irrational fears
      a. fear of not being liked
      b. fear of hurting others
G. Action model for solving interpersonal conflicts
   1. Choosing the best time
   2. Taking responsibility for your feelings

world of work.

BE AVAILABLE

Encourage students to comment and question points as they arise. Ask them to come up with their own examples, either confirming or disconfirming the information.

RESPONSIBILITY

Throughout Survival Skills, individual responsibility is repeatedly stressed. Periodically, reassess your own role. Avoid being pushed into the "expert" stance. Try to be an impartial facilitator, encouraging student's learning without passing judgments. Ensure students take responsibility for what they want to achieve.

3. The four-step language formula. a. tell the other person that what he or she is doing is upsetting you b. speak your feelings c. describe how his or her behavior is affecting you d. suggest an alternative H. Negotiating 1. Give and take 2. Compromise I. Discrimination and prejudice 1. Different types 2. Dealing with it	IDENTIFY IMPORTANT GROUP ISSUES Deal in a neutral manner with examples of discrimination. Ask individuals for personal experience of racial and sexual prejudice and discrimination. Facilitate discussion on Equal Opportunity and Affirmative Actions. Invite solutions to problems from group members.
J. Self Assessment	NEW ISSUES Be aware of any controversial issues that arise during the Self Assessment. Introduce them to the group for general discussion.
K. Assignments 1. Sharing in small groups.	ORGANIZE GROUPS Form groups as students finish writing. Limit talk to five minutes on each topic. Maintain some urgency by announcing the five minute intervals.
L. Post Assessment 1. The formula	COLLECT WORK Read and make encouraging

2. Personal examples	written comments. Arrange contract for completion of work with any students who produce low standard work.
3.5 Group Problem Solving, Goal Setting and Decision-making A. 10-step model 1. Define the problem 2. Look at the known facts a. what is happening b. who is involved c. when does the problem occur d. where does it occur e. why has it become a problem 3. Agree on your goals 4. Pool ideas for achieving your main goal without evaluating them 5. Look more closely at some of the more interesting and unusual ideas 6. Include any other ideas that you think might be helpful 7. Agree on some guidelines for achieving your goal a. be specific about minimum behavior required 8. Decide on a plan to implement your proposed solutions 9. Assess the likelihood of success 10. Evaluate the success of your decisions after they have been implemented. B. Self Assessment	ILS Survival Skills-Group Problem Solving, Goal Setting and Decision-Making PREPARATION AND MATERIALS Know the 10-step model without having to refer to it on the page. Work through the process beforehand. Have photocopies of the model. Have ready one large newsprint pad and one marker for every five students. Choose about six examples of unusual tools or materials that students are unlikely to have seen. Have them ready, but hidden. Get advice from specialists beforehand. AVAILABILITY Go around students in class while they are reading material. Help them understand the 10 steps. CHECK LACK OF UNDERSTANDING Look over individuals' answers. Give help for misunderstandings.

C. Assignment in small groups 1. Producing quality of ideas 2. Practice in thinking creatively	MATERIALS REQUIRED Sheets of newsprint and sufficient markers ARRANGE GROUPS During these assignments, there may be laughter and a lot of excited talk. Encourage composition of groups on basis of who works well together rather than primary friendships. Keep groups separated by space. Go around groups, sit in and participate. Keep up speed of work by giving limited time to gather ideas. Invite spokesperson from each group to report back on ideas. Write down ideas as they are given and summarize range of proposed solutions.
3. Identifying unusual objects.	OBJECTS REQUIRED Supply one object for each group. Choose trade tools or materials that most students are unlikely to have used.
4. Quality circle	MONITOR PROGRESS Encourage written records of proposed solutions. Ensure all members of each group take some responsibility for finished product. If possible, get results typed out so they can be shared within larger group.

D. Post Assessment	PREPARE HANDOUT Have copies of 10-step model. Make sure students check what they have written and correct it. PERSONAL EVALUATIONS Invite students to read out or tell others what they wrote under 2 in the Post Assessment.
3.6 Wider influences and responsibilities A. Relations with people in authority 1. Formal workplace a. job titles b. hierarchy 2. Informal workplace a. unwritten rules and unstated expectations 3. Showing respect and being relaxed	ILS Survival Skills-Wider Influences and Responsibilities PREPARATION Be familiar with the module and gather useful newspaper cuttings, brochures and leaflets that illustrate the range of possible influences on somebody settling down to work. BE A READY RESOURCE Give examples informally to students from personal experience to back up information. DRAW ON STUDENTS' EXPERIENCE Encourage individuals to think of relevant illustrations from their own experience in a work setting.
B. Relations with family and friends 1. Changes in responsibilities 2. Affects of changes on old relationships a. being prepared b. communicating problems 3. Planning quality time a. keeping work problems at work b. maintaining relationships	

4. Keeping up leisure activities
5. Home problems at work
   a. leaving problems at home
   b. serious problems

C. Other influences
1. apprenticeship
2. union
3. social organizations
4. other workers
5. state and federal agencies

D. Self Assessment

E. Assignment

F. Post Assessment

SUPERVISION

Ask students to show their answers to the Self Assessment. Since it is a test of comprehension, follow up on any difficulties revealed.

CHOOSING PARTNERS

Encourage students to work with someone different each time. After majority of students have completed assignments, hold a report-back session with whole group. Ask students to summarize and draw conclusions from reports given.

DEMONSTRATE

Show what is required by illustrating it on a chalkboard.

3.7 Identifying and developing individual strengths A. Evaluating yourself and others 1. Expectations 2. Personal theories a. predicting b. controlling B. Identifying personal values 1. Significant role models 2. Eliciting personal constructs 3. Bi-polar nature of constructs	ILS Survival Skills-Identifying and Developing Individual Strengths PREPARATION Work through module beforehand. Acquaint yourself with any areas that might cause difficulties in understanding. Make extra copies of exercise sheets. Refer to ILS Expectations. AVAILABILITY Be at hand throughout this module. For students to discover significant things about themselves, instructions must be followed closely. Ensure that students have had a personal relationship with each of people listed in right column. Ask them to put names they used to address these people. Check students' understanding of procedure. If necessary, go through method with whole group. Ensure that the description is of importance to each student and not superficial, such as hair color, etc. Stress that there is no correct answer; it is important for each person to write what seems opposite to him or her personally regardless of what anyone else might say.

4. Identifying important personal values	ARRANGE PARTNERS Go around and offer interpretations if requested or encourage students to draw conclusions. Ask what they recognize and what is new.
5. Evaluating yourself. a. as you feel you are b. as you would like to be c. looking at the amount of congruity	DISCUSS WITH INDIVIDUALS OR SMALL GROUPS Be tentative about what is identified. The conclusions can only be significant if the individual finds them significant. Use words and phrases such as..."it seems...," "you may..." "I would guess...." "it might indicate.." Use grid to prompt questions rather than answers.
6. Evaluating significant others a. comparing ratings	IN PARTNERS Suggest each student in turn tries to describe what people the other one might like and what people he or she might not like, based on the constructs on paper. Ensure that students follow instructions closely. Encourage them to search for all influences. If they have difficulty, suggest situations where students make choices, e.g. career, friends, classes, out-of-school activities.
C. Influences on personal decisions 1. How much are you in control of your own life? 2. Positive and negative influences. a. other people b. aspects of self c. organizations	

D. Time management 1. Organizing skills 2. Being responsible for your own life 3. Prime time 4. Making a time chart a. procedure b. interpretation	EXTRA COPIES Have ready prepared extra copies of time chart Ensure agreement on completing time chart. Go over method of calculating actual time. Illustrate on chalkboard or newsprint paper; give example of one day's record. Use tally system. CHECK STUDENTS' UNDERSTANDING Do this before anyone starts recording. It might be advisable to go over procedures one day ahead and practice be done in class.
E. Post Assessment 1. Personal values 2. Influences 3. Use of time	Collect, read and hand back during class. Give encouraging comments.

3.8 Worksite Visits A. Building realistic expectations 1. Questioning job descriptions 2. The human side of the job 3. On-the-job visits 4. Talking with people in the trade B. Group visits 1. Exposure to different working environments 2. Practice in observation 3. Asking questions C. Individual visits 1. After working hours 2. Interviewing the worker 3. Arranging the visit D. Self Assessment-Comprehension E. Assignment 1. Looking at Help Wanted ads	ILS Survival Skills-Finding a Job Worksite Visits PREPARATION Arrange with any company that allows it a group visit during working hours. Have sufficient copies for use by whole class of Help Wanted ads from local newspapers. Become an informed source of possible contacts for student interviews with journeymen and apprentices. CHECK UNDERSTANDING Ensure students comprehend all of the material before making any contacts or visits. HELP WITH ASSIGNMENTS Supply Help Wanted sections--one to each student. Suggest they read through and circle in ink interesting ads. Stress importance that each works on his or her own; it is practice in looking for jobs. Collect what students write and report back

	to whole group with summary of students findings.
2. Writing realistic job descriptions.	Read and comment on students' descriptions. With individual's permission, read out selection to whole group and invite comparisons with job descriptions in newspaper.
3. Contacting a journeyman or apprentice	Supply names and encourage students to come up with own contacts. If necessary, two students could team up to make a visit. Role play telephone contact and get students to copy out suggested questions. Make individual contract with each student, setting deadlines to call, to visit and to report back. Check on progress and share with rest of group.
4. Asking questions	Arrange for individuals to report back to whole group at same session.
5. Making a group visit	Go over observations and questions beforehand. Ask students to write questions down. Divide questions, and order of asking, among group. Add any other questions suggested by group.
6. Reporting back	Ensure that each student records his or her observations. Invite individuals to report on their feelings and findings.
7. Discussion	Lead group discussion on overall findings.

3.9 Resumes A. Nature and function 1. Self advertisement 2. Summary of strengths and skills 3. Different ways to use resumes 4. Contrast application forms B. Extracts from resumes 1. People with little work experience 2. Presenting the best interpretation of the facts C. Suggested format 1. Position desired a. finding out about the job b. matching your skills 2. Education 3. Relevant work experience 4. Other relevant experience 5. Personal data 6. References a. making a list of your achievements D. Identification of your skills 1. Personal and interpersonal skills 2. Skills used in leisure and work activities a. what could go wrong b. what skills you need to avoid mistakes c. stamp collecting d. planting a garden E. A professional finish 1. Typing 2. Paper	Arrange another worksite visit. ILS Survivial Skills-Finding a Job-Resumes PREPARATION AND MATERIALS Large pad of newsprint and sufficient markers for group. Ensure that there are adequate flat surfaces.

F. Cover letter
  1. Why them?
  2. Why you?
  3. Let's meet

G. Self Assessment
  1. Personal and interpersonal skills

  2. In a job context

  3. Analyze three examples of work

H. Post Assessment
  1. Organizing personal work experience

HELPING WITH ASSIGNMENTS

Be available throughout, when students are working on Self and Post Assessment. Write on chalkboard further suggestions of personal and interpersonal skills.

Suggest students help each other in finding relevant examples of their application of skills.

Allow partners to choose each other. Emphasize broad definition of work to include paid and unpaid, part-time, etc. Give examples.

Model how students can help each other. Go around and ask questions to elicit relevant information.

Supply sheets of newsprint and markers. Tell students to use the full area of paper. Check that students are recording all the suggested information.

Inspect sheets individually and suggest best way to organize data. Advise on where to include or omit dates and which experience to group or

2. Writing a draft resume	separate. Give encouragement and direct help with drafting of resume. Take best draft, type it and duplicate it on quality colored paper. With permission of student, share with whole group. Encourage sharing of draft resumes. Offer to help later if individuals want to develop a finished version of resume.

3.10 Interviews

A. Subjective nature of interviews
   1. Content of hiring interviews
   2. Interviewers' opinions
   3. Interviewees' opinions

B. Facts and opinions
   1. Giving honest opinions
   2. Interpreting facts
   3. Quoting references and examples
   4. Deciding what is relevant

C. Employers' expectations
   1. Objective measures of aptitude and achievement
   2. Appropriate attitudes and work habits

D. How to communicate interest and enthusiasm
   1. Be genuine
   2. Be informed
   3. Showing enthusiasm
      a. non-verbally
      b. how to speak and what to say

E. How to communicate that you will be a good worker
   1. Finding examples

F. How to show you are trainable
   1. School and non-school

G. How to show you work well with people
   1. Relations with the interviewer
   2. Giving examples

H. How to be realistic about what you want
   1. Knowledge of the work environment
   2. Knowledge of the career structure
   3. Answering questions about goals

ILS Survival Skills-Finding a Job-Interviews

PREPARATION AND MATERIALS

Read material beforehand and recall examples from own experience. Have two copies of observers' checklist for each student.

I. Appearance
  1. Clothes
  2. Grooming

J. Non-verbal behavior
  1. Punctuality
  2. Nervousness
  3. Body posture
  4. Gestures
  5. Smoking and chewing

K. Being positive
  1. About yourself
  2. About others

L. Self Assessment
  1. Role play
    a. interviewer
    b. interviewee
    c. observer
  2. List of questions
  3. Checklist

M. Post Assessment
  1. Interview in front of the group
  2. Questions from Joint Apprenticeship Committee
  3. Giving positive feedback

FORM TRIADS

Go through checklist to ensure understanding. Choose best working groups. Keep it moving by limiting time for each role play. Be willing to model positive answers in interviewee's role.

Ask for a volunteer, then allow him or her to select next interviewee. Suggest use of observer's checklist, plus any other positive comments. Give feedback from group and yourself, immediately after each interview. Invite interviewee to share his or her feelings experienced during role play.

3.11 Appropriate work habits and attitudes A. Surviving on the job. 1. Keeping informed B. Employer's expectations 1. Being punctual and dependable 2. Being honest 3. Being loyal 4. Being willing to learn and able to take criticism C. Expectations of fellow workers 1. Proving your competence 2. Being reliable and dependable 3. Being a learner 4. Being enthusiastic and interested 5. Being honest and loyal D. Proving your competence to your supervisor 1. High standard of work 2. Keeping a written record of your achievements 3. Showing initiative 4. Taking on responsibility 5. Asking for help E. Interference of personal habits 1. Substance abuse 2. Seeking help	ILS Survival Skills-Finding a Job -Appropriate Work Habits and Attitudes BE A RESOURCE Share personal experience with individuals. Encourage students to ask any older people about work habits and attitudes. Give time for sharing students' findings. Show relevance of previous modules to both 2 and 3. Ask individuals what expectations a member of Survival Skills class has. POSSIBLE DISCUSSION What do individuals expect of friends? What are peer group's attitudes toward 4? Be sensitive to possibility of substance abuse affecting student performance. Learn physical indicators; have referral addresses available.

F. Self Assessment

G. Post Assessment

Check comprehension.
Tell students to repeat reading and doing Post Assessment until acceptable standard is reached. Discuss with individuals any disagreements over appropriate answers and be flexible.

SUGGESTED READINGS:

Alberti, R.E. and Emmons, M.
Your Perfect Right
Impact, 1974.

Blicq, Ron
On the Move: Communication for Employees
Prentice-Hall, 1976

Bolles, Richard N.
The Three Boxes of Life
Ten Speed Press, 1978

Fast, Julius
Body Language
Pocket Books, 1971

Chapman, Elwood N.
Your Attitude is Showing: A Primer on Human Relations
Science Research Associates, 1972

Ford, George A.
Planning your Future: A workbook for Personal Goal Setting
University Associates, 1976

McCay, James T.
The Management of Time
Prentice-Hall, 1977

Nelson, Robert E.
Decision Making
Vision Publishing, 1976

Peale, Norman V.
The Power of Positive Thinking
Prentice-Hall, 1952.

4.0 Trade Math

INSTRUCTIONAL OUTCOMES: The student will complete a diagnostic examination to determine his or her level of math competency, and will receive instruction in those areas of mathematics in which he or she experiences difficulty.

INTRODUCTION: People in every apprenticeable occupation routinely use mathematics in their work. The skilled worker who can perform fast and accurate math calculations can work quickly and efficiently.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
4.1 Math Diagnosis A. Used to test skills 1. Math diagnostic exam, attached, or other suitable exam.	Explain "placement exam" concept Administer exam Grade performance
4.2 Math Remedial A. Used to upgrade skills 1. Modules, as listed, improve performance levels.	Assist student to achieve performance level

ILS Math--Linear Measurement	
ILS Math--Whole Numbers Addition Subtraction Multiplication Division	
ILS Math--Addition & Subtraction of common fractions and mixed numbers	
ILS Math--Multiplication & Division of common fractions and whole and mixed numbers	
ILS Math--Compound numbers	
ILS Math--Percent	
ILS Math--Ratio and Proportion	
ILS Math--Decimals Addition Subtraction Multiplication Division	
ILS Math--Perimeters Areas and Volumes	
ILS Math--Circumference and Area of Circles	
ILS Math--Areas of Plane Figures, Volumes of Solid Figures	
ILS Math--Metrics	

4.0 Trade Math Diagnosis
Placement Test

Name _____

Date _____

1.

Read the distance from the start of the ruler to the letters A through O to the nearest 1/32".

A= _____ F= _____ K= _____

B= _____ G= _____ L= _____

C= _____ H= _____ M= _____

D= _____ I= _____ N= _____

E= _____ J= _____ O= _____

2.

686 + 240 + 1,320 + 16 + 400 =

40 - 16 =

292 X 16 =

180 ÷ 5 =

A contractor buys 400 sacks of rock for three different jobs. On the first job he uses 78 sacks; on the second, 85 sacks; and on the third, 205 sacks. How many sacks does he have left?

A contractor's bid on a school building is $78,265. When one wing is omitted to cut costs, he is able to cut his bid by $16,228. What is his new figure?

3.

If a bundle of rock lath weighs 35 lbs. and it is permissible to place 700 lbs. on any one area on a floor, how many bundles can be placed on any one area?

If 5 lbs. of putty are required to install one light of glass, how many lights can be installed with 85 lbs.?

4.

The improper fraction 48/32 expressed as a mixed number is:

The mixed number 4 3/8 expressed as an improper fraction is:

What is the least common denominator for the following group of fractions: 1/8, 1/2, 1/4, and 1/12?

What is the sum of the following fractions: 7/8, 3/4, and 9/16?

If 3/4 is subtracted from 11/12, the difference is:

The sum of 1 5/8, 2 11/64, and 19 1/4 is:

5.

One roof is 1/3 larger in area than another. The smaller roof takes 24 squares of roofing material. How many squares of roofing material will the larger roof take?

One-third of a box of glass is needed to glaze the north elevation of a building; 2/3 of a box is needed to glaze the south elevation; 1/16 of a box is needed to glaze the east elevation; and 1/2 of a box is needed to glaze the west elevation. How many boxes are needed to glaze all four elevations?

From a bundle containing 101 linear feet of molding, a cabinetmaker uses the following amounts: 11 1/3', 8 3/4', 12 1/8', and 9 5/8'. How many linear feet of molding does he use in all?

6.

The product of 1/2 X 7/8 is:

The quotient of 1/4 ÷ 1/3 is:

If a roll of carpet weighs 467 1/2 lbs. and a running foot of the carpet weighs 2 1/8 lbs., how many running feet are in the roll?

A piece of pipe must be cut to 3/8 the length of another pipe, which is 9' long. How long a piece must be cut?

7.

Write each of the following as decimals.

Seven tenths

Sixteen hundredths

Fifteen thousandths

Eleven ten-thousandths

Two thousand one hundred fifty-two thousandths

Convert each of the following measurements to feet in decimals.

4' 6"

2' 4 1/4"

A house with a floor area of 1,860 sq. ft. is estimated to cost $18,042. What is the cost per square foot?

A stack of plastic sheets measures 2.28" thick, and it is known that the sheets average 0.06" in thickness. How many sheets are in the stack?

8.

The labor cost for the concrete work for a house was $248. The material cost $210. What percent of the total cost of the concrete work was for material?

An architect indicates a 1/8" = 1'0" scale in the drawing of a swimming pool. What is this scale expressed as a ratio?

On a tile job in which fireclay is to be used, a tilesetter tells his helper to mix mortar according to the following formula: 6 buckets of river sand, 1 bucket of fireclay, and 2 buckets of cement. What is the ratio of sand to fireclay in the mixture?

9.

Divide 19' 2" by 3' 10".

How many pieces of 2' 3"-wide gypsum lath will be needed to cover a wall 48' 6" long?

10.

What is the perimeter of a room 20' wide and 30' long?

What is the area, in square feet, of a floor 42' by 42'?

How many cubic yards of dirt have been removed for the basement and foundations of a house if the excavation is 35' long, 35' wide, and averages 5' deep?

The area of a circular putting green with a radius of 17' is how many square feet?

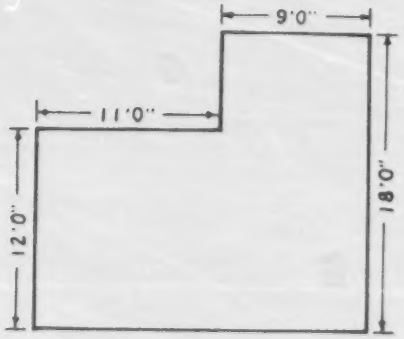
What is the area of a circular floor with a diameter of 10' 6", to the nearest square foot?

What is the area, in square inches, of an acute triangle with a base of 8 1/2' and an altitude of 11 1/4"?

What is the area in square feet, of the floor shown below?

How many cubic yards of concrete will be needed for the foundation walls and footings in the plan below if the walls are 6" thick and 18" deep, and if the footings (shown in dotted lines) will require 2 5/27 cu. yd. of concrete?

1. 6
2. 6 2/3
3. 7
4. 7 1/6



5.0 Physical Requirements/Drywall

INSTRUCTIONAL OUTCOMES: The student will demonstrate knowledge of physical requirements of the trade and the processes of physical development.

INTRODUCTION: The trade requires certain physical skills and abilities of the worker. It is necessary that the student be aware of the physical demands of the trade and understand factors of physical development.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
5.1 Physical Requirements A. Strength 1. Lifting. a. material and equipment weighing 10 to 150 lbs. (e.g. gypsum board) 2. Carrying. a. material and equipment weighing 10 to 150 lbs. (e.g. gypsum board) 3. Pushing. a. placement of materials. 4. Pulling. a. alignment of materials.	On-site visit or classroom simulation. A. Demonstrate B. Lead discussion or question on job site C. Discuss proper technique D. Administer work sheet

B. Balance
   1. Climbing.
      a. ladders, scaffolds.
   2. Balancing.
      a. ladders, walk ups, scaffolding.

C. Body Dexterity
   1. Stooping.
      a. nailing low points of gypsum board.
   2. Kneeling.
      a. cut outs for outlets on walls.
   3. Crouching.
      a. nailing of walls.
   4. Standing.
      a. nailing of walls.

D. Manual Dexterity.
   1. Reaching above shoulder.
      a. installing ceiling gridwork.
   2. Reaching below shoulder.
      a. picking up materials and equipment.
   3. Handling.
      a. gripping tools (e.g. hammers).
   4. Fingering.
      a. pickup, holding, placing nails, screws and other fasteners before driving.
   5. Feeling.
      a. testing for smooth even joints/ surfaces).

E. Talking
   1. Normal communication.

F. Hearing

1. Normal communication.

G. Vision

1. Normal vision.
    a. moving about jobsite.
2. Acuity near.
    a. accurate measurements and cuts.
3. Acuity far.
    a. uniformity of overall surface.
4. Depth perception.
    a. while on ladders scaffolding and walk-ups.

H. Coordination

1. Hand-arm.
    a. using hammer.
2. Foot-leg.
    a. climbing ladders.
3. Eye-hand-foot.
    a. working with material/tools while on ladders, walk-ups or scaffolding.

PHYSICAL ACTIVITIES PRESENT IN THE TRADE: REQUIREMENTS (to be completed by student)

STRENGTH	Weight	Frequency	BODY DEXTERITY	Degree of Activ.	Frequency	MANUAL DEXTERITY	Degree of Activ.	Frequency
Lifting			Stooping			Reaching-above shoulder		
Carrying			Kneeling			Reaching-below shoulder		
Pushing			Crouching			Handling		
Pulling			Crawling			Fingering		
BALANCE	Need	Frequency	Standing			Feeling		
Climbing			Sitting			TALKING (speech)		Frequenc
Balancing			Walking			HEARING	Acuity	Rang
VISION	Need	Frequency	Reclining			COORDINATION	Degree	Frequenc
Normal vision			VISION (Cont'd)			Hand-arm		
Acuity-near			Color vision			Foot-leg		
Acuity-far			Field of vision			Eye-Hand-Foot		
Depth perception								

5.2 Individual Developmental Processes A. Maturation 1. Causes physical changes in height and body proportion. 2. Causes emotional changes. 3. A gradual process. 4. Fluctuates from person to person. B. Nutrition 1. Vital to normal growth and development. 2. Essential food groups. a. dairy products. b. meat. c. vegetables and fruits. d. bread and cereals. C. Personal Care and Exercise 1. Good grooming habits. 2. Sufficient sleep and relaxation. a. fatigue increases chances for accidents. 3. Hobbies. a. source of relaxation, help to maintain good attitude. 4. Daily exercise. a. stimulates interest. b. relieves stress. D. Substance Abuse 1. Marijuana. a. affects nervous system. b. affects thinking, judgment and coordination. c. long-term effects unknown.	ILS Physical Development Explanation and Discussion Invite Specialist

2. LSD. a. affects chemical level in brain. b. produces bizarre mental reactions. 3. Barbiturates. a. one of most commonly abused drugs. b. slow responses. c. physically addicting. d. long-term use causes personality disorders. 4. Amphetamines. a. affect central nervous system. b. commonly abused. c. cause psychological dependence. d. dull emotions and impair ability to make decisions. 5. Alcohol. a. psychologically addicting.	
E. Meeting Various Trade Requirements 1. Recognize and prepare. a. natural maturation processes may play role. b. exercise will play role.	On-job-site visitations and consultation with occupational therapist.

6.0 Safety

INSTRUCTIONAL OUTCOMES: The student will be able to identify those hazards, acts and conditions which affect safety on the job and will be able to identify ways to avoid or correct them.

INTRODUCTION: A good worker is a safe worker; injury affects production, as well as the ability of a person to earn a living.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
6.1 General Safety A. Average--over 14,000 employees killed each of past several years. 1. From 1960 to 1970 over 150,000 fatalities. 2. Cost, excluding property damage, $11.5 billion. 3. 50 million employee days lost in 1972. B. Accidents 1. An unplanned and unforeseen occurrence that interferes with or interrupts orderly progress of activity.	Explain, Discuss and Demonstrate Where Appropriate ILS General Safety

2. Should be analyzed to determine why and how happened.
   a. unsafe conditions; poor or defective equipment, poor housekeeping, inadequate lighting.
   b. unsafe acts; loose-fitting clothing; horseplay, removing guards.

C. OSHA
   1. Williams-Steiger Occupational Safety and Health Act, 1970.
   2. Requires employers to provide safe conditions.
   3. Requires employees to comply.
   4. Covers about 60-million people; excludes federal employees.

6.2 Personal Safety

A. Safety Consciousness
   1. Be aware of good safety practices.
      a. learn the rules.

B. Safety Awareness
   1. Put safety consciousness to use.
      a. obey the rules.

C. Head Protection
   1. 130,000 head injuries in 1976.
   2. Wear clean, adjustable hard hat.

D. Eye and Face Protection
   1. 1,000 eye injuries each day.
   2. Wear safety glasses, goggles, masks; shields if near harsh chemicals.
   3. Wear safety glasses under shields.

ILS Occupational Safety--
Personal Safety

E. Hearing Protection
   1. Ear inserts lower high frequency.
   2. Ear muffs lower low frequency.

F. Lung Protection
   1. Mechanical filters protect against non-toxic dust.
   2. Chemical-cartridge types protect against low concentration of some vapors.
   3. Gas masks protect against organic vapers and toxic gases for limited time.
   4. Supplied-air respirators protect against high concentrations of gases and fumes.
   5. Self-contained breathing apparatus protects against high concentrations of gases, vapors, dusts, etc.
   6. Air line respirators protect against high concentrations of dusts, fumes, mists, and low concentrations of gases.
   7. Select proper one for each job.

G. Hand Protection
   1. Average of over 1,300 disabling hand and finger injuries each day in 1976.
   2. Gloves.
      a. asbestos protects against thermal burns, hot or cold.
      b. metal mesh protects against cuts and sharp objects.
      c. rubber protects against electrical and chemical burns.

d. neoprene and vinyl protect against chemicals. e. leather protects against rough objects, heat and sparks. f. fabric protects against dirt, abrasions, slivers. g. coated fabrics protect against chemicals. 3. Creams also used. H. Foot Protection 1. Over 200,000 disabling foot and toe injuries each year. 2. Wear leather steel-toed safety shoes or boots.	
6.3 Fire Types and Prevention A. Fire Types 1. "Class A" of wood, cloth, paper. 2. "Class B" of liquids and gases, paint, grease. 3. "Class C" of energized electrical equipment. 4. "Class D" of metals or metallic dusts. B. Methods of Extinguishing 1. Absorb heat--add water. 2. Smother--add dry chemicals, foam. 3. Remove fuel--shut off supply. C. Fighting Classes of Fires 1. Class A a. water to cool heat.	ILS Fire Types and Prevention

2. Class B.
   a. CO_2, powder to smother fire.
3. Class C.
   a. non-conducting agent.
   b. attempt to de-energize.
4. Class D.
   a. special extinguishing agent for types of metals.

6.4 Hygiene Safety

A. Exposure to Toxic Materials
   1. Can create health hazards.
   2. Internal exposure.
      a. breathing contaminants.
      b. swallowing contaminants.
      c. absorption through skin.
   3. External exposure.
      a. contact with skin.
      b. can affect senses.

B. Noise Pollution
   1. Measured in decibels.
   2. Can affect hearing over period of time.
   3. Affects other parts of body.
      a. changes size of blood vessels, makes heart work faster.
      b. produces headaches.
      c. negatively affects nerves, decreases powers of judgment.

ILS Occupational Safety--Hygiene Safety

C. Airborne Contaminants 1. Dusts; particles generated mechanically. a. can affect skin, eyes, lungs. 2. Fumes; solid particles of condensation process. a. common fumes caused by oxidation of metal. 3. Mists; particles of liquids or liquids and solids. 4. Gases; low density, change to liquids or solids. 5. Vapors; gases normally in solid or liquid state at room temperature. 6. Contaminants may affect body in four ways. a. as irritants to lungs. b. as asphyxiants, prevent blood from normal transfer of oxygen. c. as anesthetics or narcotics, cause drowsiness and nausea. d. as systemic poisons, attack vital organs.	
6.5 Hand Tool Safety A. Hammers 1. Face should be 3/8" larger in diameter than object. 2. Strike object squarely and flatly. 3. Replace damaged handles before use. 4. Don't strike wood- or plastic-handled chisels. 5. Don't pound with cheek (side) of hammer.	ILS Occupational Safety--Hand Tools

6. Don't pound sharp objects with mallets

B. Chisels, Punches, Nail Sets
   1. Be sure tools are ground at proper angles.
   2. Remove mushroomed heads.
   3. Hold tools with tongs if being struck by another worker.

C. Screwdrivers
   1. Select correct size and tip style.
   2. Don't pound on screwdrivers.
   3. Don't put hands and fingers under work.
   4. Don't use screwdrivers to pry.
   5. Use appropriate wrench on square-shank screwdriver.
   6. Use magnetized screwdriver to start screws in awkward places.
   7. Use non-sparking screwdrivers if working near explosive hazard.
   8. Use insulated screwdrivers when working on electrical devices.
   9. Don't use screwdriver for electrical testing.

D. Wrenches
   1. Select correct type for job.
   2. Select correct size for snug fit.
   3. Don't use cheater bars.
   4. When using adjustable wrenches, always pull, always against fixed jaw.
   5. Be sure wrench fits squarely, not tilted.
   6. Don't pound with a wrench.

7. Use penetrating oil on "frozen" objects.

E. Pliers

1. Select correct size and type.
2. Don't use cheater.
3. Excessive heat will draw temper from metal.
4. Don't pound with pliers.
5. Cutting pliers.
   a. cut at right angle to wire.
   b. point open side down so cut end will not fly out.
6. Use pliers with high dielectric insulation when working on electrical devices.
7. Keep jaws clean.

F. Vises

1. Work as close to vise as possible.
2. Clamp objects in middle of jaws.
3. Don't use cheater bar.
4. Use adequate-sized vise.
5. Support far end(s) of long work to avoid putting excess strain on vise.

G. Clamping Tools

1. Select correct size and type.
2. Keep moving parts clean and lightly-oiled.
3. Don't over-tighten.
4. Don't use cheater.
5. Don't use for hoisting materials.

H. Saws

1. Select correct size and type.
2. Maintain sharpness.
3. Check material before sawing.
4. Use sawhorse or bench, not knee, when sawing.
5. Make sure handle is clean and tight.
6. Be aware of hand, finger and leg position before sawing.
7. Hacksaw teeth should point away from handle to saw on push stroke.
8. Wear gloves when sawing metal.

I. Snips, Shears

1. Select correct size and type.
2. Keep blades sharp.
3. Do not cut wire.
4. Use only hand pressure.
5. Wear gloves.

J. Files, Rasps

1. Select proper size and type.
2. Don't use wood file or rasp on metal.
3. Cut on forward stroke.
4. Keep teeth clean.
5. Use proper sized handles.
6. Don't use to pry.

6.6 Power Tools

A. Circular Saws

1. Operate only with fixed guard on upper half of blade and flexible guard on lower half; don't tamper with guards.

ILS Occupational Safety--Power Tools

2. Blade should clear material by maximum 1/8".
3. Operate by not forcing; forward motion only.
4. Check material for nails, grit, etc.; support material so it doesn't bind.
5. Allow blade to come to full speed before cutting; prevents kickback.
6. Make sure lower guard has returned before setting down.
7. Clean sawdust from lower guard often.

B. Sabre Saws
1. Select proper blade for material.
2. Feed blade slowly.
3. Hold saw base against material.

C. Pneumatic Tools
1. Secure all hoses.
2. Clean with compressed air only if less than 30 PSI with guard.
3. Hoses over 1/2" diameter must have safety valve at source.
4. Hose couplings must have safety connection.
5. Nailers should have device to prevent ejecting when not in contact with work.
6. Point tools toward floor when carrying.
7. Shut down, turn off air supply, bleed line.
8. Wear safety equipment, goggles, shields, etc.

D. Hydraulic Power Tools

1. Fluid used must be fire-resistant and approved by U.S. Bureau of Mines.
2. Don't exceed manufacturer's pressure recommendations.
3. Don't touch stream of fluid from leak.

E. Compressors

1. Storage tanks must be approved by American Society of Mechanical Engineers.
2. Drain condensed water daily.
3. Tanks must have safety relief valve.
4. Pressure gauge must be maintained accurately.

F. Powder-Actuated Tools.

1. Test before loading each day.
2. Load just before using.
3. Wear hearing, eye protection.
4. Don't point at anyone; keep hands away from barrel end.
5. Leave protective guards in place.
6. Must have safety device to prevent accidental firing, and to prevent firing if tilted.
7. Don't operate near combustion hazard.
8. Should only be operated by trained and qualified personnel.
9. Return tool to case after use.
10. Don't drive fasteners into extremely hard or brittle materials.

7.0 First Aid

INSTRUCTIONAL OUTCOMES: The student will successfully complete an eight-hour multi-media first aid class, taught by a qualified instructor, and will obtain a First Aid Card.

INTRODUCTION: Persons employed in any occupation, especially those occupations which deal with power and hand tools, encounter situations when first aid may be necessary to prevent an injury from becoming more serious. A first aid course, successfully completed, prepares individuals to cope with many of those situations.

PRESENTATION

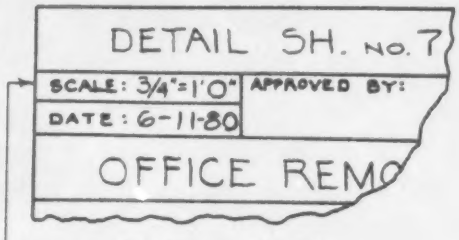
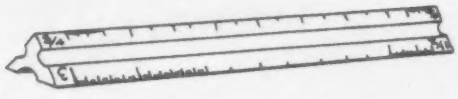
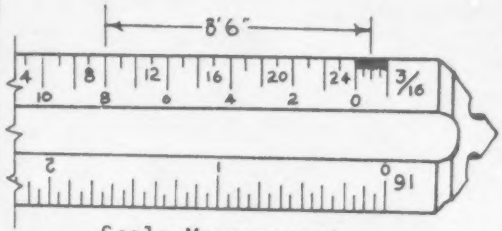
TEACHING OUTLINE	TEACHING METHODS AND AIDS
7.1 First Aid A. Eight-hour multi-media course, or equivalent, offered by: 1. Red Cross 2. Medical Services, Inc. 3. Police Department 4. Fire Department 5. Other service and health organizations.	Administer course

8.0 Blueprint Reading

INSTRUCTIONAL OUTCOMES: The student will be able to identify and use the concepts of working drawings and their components: scaling and dimensioning, sketching, orthographic, pictorial and isometric projections, as well as construction symbols commonly found in blueprints.

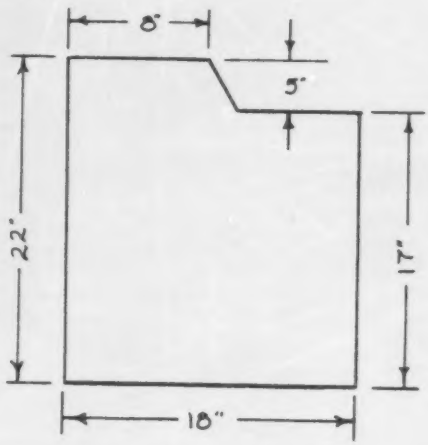
INTRODUCTION: A skilled worker must understand the language of blueprints to advance in any trade where prints are used.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
8.1 Scaling and Dimensioning A. Scale 1. The ratio of drawing dimensions to object dimensions. 2. Always indicated on drawing. 3. Vary, depending on size of paper and detail to be shown. 4. Measured by architect's scale, engineer's scale, draftperson's scale. 5. Technique of measurement: architect's scale is placed on drawing, read in marked increments.	 Scale as Shown  Architect's Scale  Scale Measurement

B. Dimensions

1. Are size descriptions for drawn objects.
2. Located on working drawings by:
   a. dimension lines--indicate distance between two points (usually between two extension lines); contain dots or arrows at ends.
   b. extension lines--mark the beginning and end of distance.
3. Placed in orderly fashion on drawing.



Dimensions

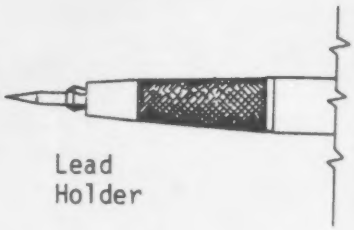
8.2 Sketching

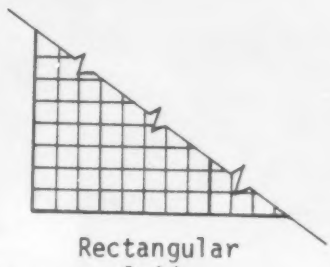
A. Uses

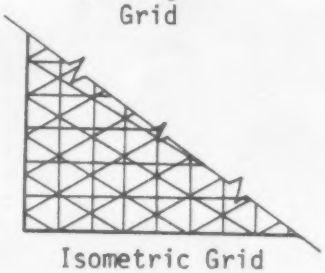
1. For conveying rough ideas or organizing ideas.
2. For details, developed from existing drawing.

B. Materials

1. Pencil, soft lead.
2. Eraser, gum.
3. Paper, coordinate.
   a. rectangular grid
   b. isometric grid


Lead Holder


Rectangular Grid


Isometric Grid

C. Size, Proportions

1. Generally not drawn to scale, but should remain proportionately accurate.

D. Procedures

1. Determine overall size of object.
2. Create short lines by one firm, quick stroke.
   a. go through motion of stroke with pencil removed from paper.
   b. pencil point on paper entire time.

E. Basic Forms

1. Squares, rectangles, triangles, circles.
2. Layout crosses (intersecting lines) to provide reference points for drawing.
3. Circles and arcs sketched with little finger of drawing hand as pivot; move paper, not hand.

8.3 Drawing Types and Views

A. Orthographic Projection

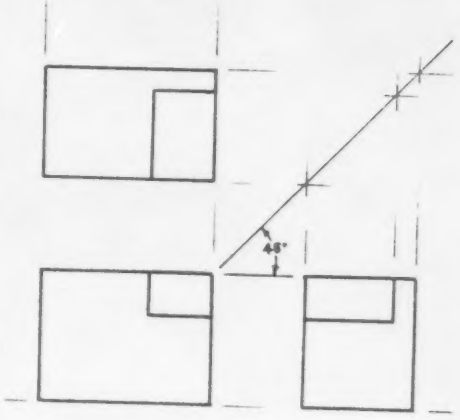
1. Called orthograpic drawings or "true" drawings, also "three-view" or "multiview."
2. Almost universally used in architect and engineer drawings.
3. Drawn to scale.
4. Each view shows one face or side of object as seen from square view.
5. Possible to indicate true size, shape and location of all object parts, and dimension clearly.

Explain and Discuss;
All References made to:

ILS Scaling and Dimensioning

ILS Sketching

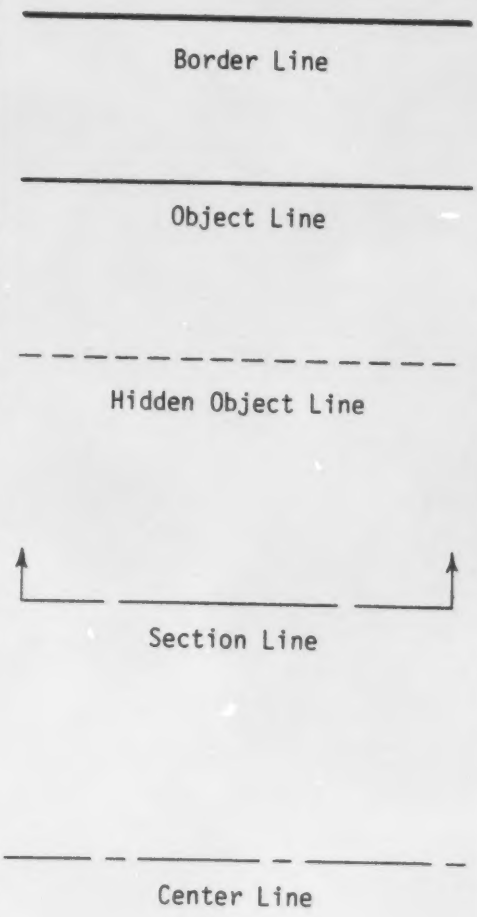
ILS Types of Drawings and Views



Orthographic Drawing

6. Each view is 90^{o} rotation of other view.
7. All related views must be studied together to visualize object shape.

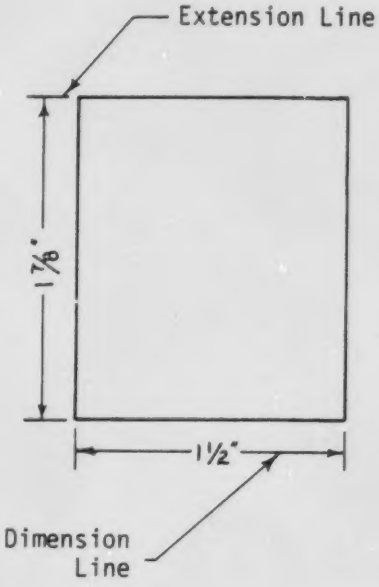
B. Types of Lines
   1. Border Line.
      a. a thick, solid black line (blue).
      b. shows geographical or space borders.
   2. Visible object line.
      a. a thinner solid black line (blue).
      b. shows visible edges of object.
   3. Hidden object line.
      a. a line of equidistant and equal length dashes.
      b. shows edges of important elements hidden from view.
   4. Section line.
      a. a thick, broken line with arrows turned at 90^{o} angle.
      b. delineates sections of object represented.
   5. Center line.
      a. a thin line of alternately long and short dashes.
      b. shows centers of objects (doorways, e.g.) and relationship with given dimensions.



6. Long break line.
   a. a thin solid line, straight, with occasional zig-zags.
   b. indicates a break in object.
7. Extension line.
   a. a short thin line, drawn perpendicular to dimension line.
   b. shows beginning and ending point of measurement; lines are extensions of object or part.
8. Dimension line.
   a. a long thin line, with dots or arrows on each end, broken in middle for numbers.
   b. touch extension lines and give measurement from one extension line to another.

C. Pictorial Drawing
   1. Shows more than one face of object.
   2. Advantage: easier for lay person to understand.
   3. Disadvantage: distorted object lines and angles.
   4. Useful to give "completed" look renderings.

Long Break Line

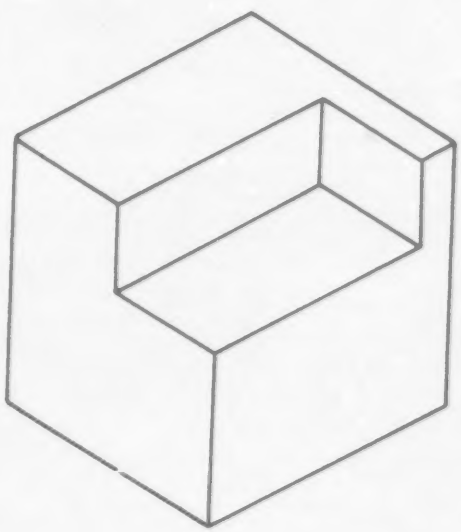


D. Axonometric Drawing

1. A type of pictorial drawing.
2. Three principle axes used.
3. Can represent any object by changing viewpoint.
4. Isometric position is principle one used.

E. Isometric Drawings

1. Viewed from exact position in which three of sides are equally foreshortened.
2. Three axes: one axis vertical and other two at 30^{o} from horizontal base.
3. Will appear in true proportion.
4. Will not appear in true scale lengths.



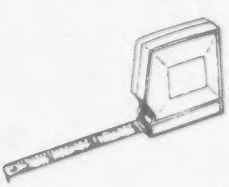
Isometric Drawing

9.0 Trade Tools/Drywall

INSTRUCTIONAL OUTCOMES: The student will be able to identify, select and demonstrate the use of common tools of the trade.

INTRODUCTION: A skilled worker must be able to select the necessary tools for a given task and use them correctly in order to perform the job satisfactorily.

PRESENTATION

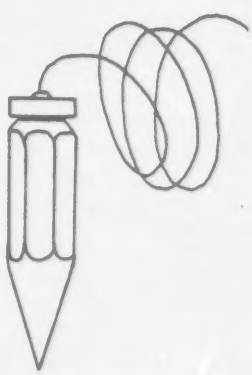
TEACHING OUTLINE	TEACHING METHODS AND AIDS
9.1 General Tools A. Marking and Measuring Tools 1. Steel tapes a. available in various lengths, but 16" to 25' and 100' are both used for drywall. b. 100' tapes are used for layout work in walls and ceilings; shorter tapes for measuring and marking. c. extend to desired length, read, and mark or record measurement. 2. 4' T-square a. made of steel or aluminum. b. used for marking score/cut lines on sheetrock.	Explain and Demonstrate ILS Measuring, Layout and Leveling Tools 

c. provides accurate 90° lines to sheetrock edge by placing top of "T" along edge and scribing along blade.

3. Chalk line
   a. loose or enclosed reel with various colors of chalk (usually red or blue).
   b. used to mark layout lines on floors ceiling and walls.
   c. stretch string tautly between two marks, lift string away from surface and release.

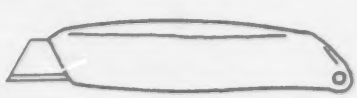
4. Levels
   a. water or spirit-filled calibrated vials set in wood or metal holders.
   b. held flush against surface to determine level/plumb.
   c. when in place, bubble in vial should be centered between calibrations if surface is level/plumb.

5. Plumb bob
   a. weighted, pointed object suspended on a string or metal line.
   b. designed to provide vertical check for accurate surface plumb.

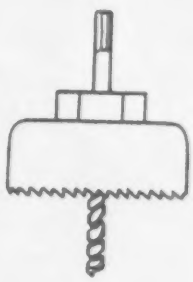


B. Cutting/Shaping Tools

1. Utility Knife
   a. metal handle with replacement straight-edged blades; handles come in various shapes.
   b. used for scoring or cutting drywall material.
   c. draw knife along straight edge toward self, cutting through surface skin of drywall material.



2. Circle cutter
   a. fixed diameter or adjustable drill bits of diameters from ½" to 5".
   b. used for making round holes in drywall, for electrical or plumbing openings.
   c. after marking desired size and location for hole, select correct hole saw and drill out opening.

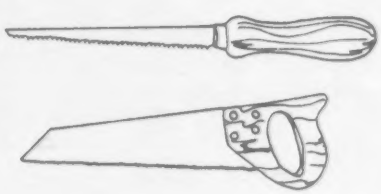


Hole Saw

Expansion Bit

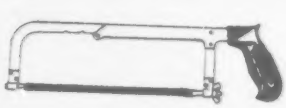
3. Saws
   a. keyhole saw
      (1) long tapered blade with fine tooth pattern.
      (2) used for cutting interior holes in drywall, especially irregular shapes.
      (3) drill starter hole (slightly larger than saw tip) inside hole, cut outline to shape.

   b. sheetrock saw
      (1) designed to cut drywall material without damaging surface skin.
      (2) used to cut drywall to size and shape.
      (3) mark piece to length and cut.



Sheetrock Saw

   c. hacksaw
      (1) metal adjustable length saw designed to hold fine tooth metal cutting blades.
      (2) used to cut metal fabrications including angle, channels and metal studs.
      (3) held either with one hand at handle or using both hands, one at each end; use push and draw strokes; use care to



adjust for proper tension on blade.

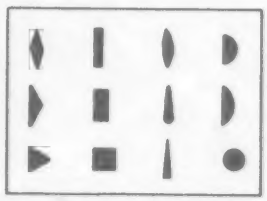
d. outlet cutter
   (1) designed to cut electrical wall outlet holes in walls
   (2) carefully mark outlet location, cut hole.

e. rasps
   (1) rough files/sureform tools of various profiles--curved, flat, round, V grooved.
   (2) used to shape holes to conform or adjust to fit.
   (3) using a filing motion remove waste material until desired finished shape is achieved.

f. pliers/snips
   (1) side cutting pliers, end snips, tin snips and aviation clips.
   (2) used for cutting or shaping wire or metal fabrications.
   (3) select snips for straight line or curved cutting work; pliers for bending and clipping.

g. whetstone
   (1) sharpening stone for knife blades.
   (2) used to resharpen blades for utility knives.
   (3) hold blade at angle, use circular motion, rotate away from blade edge, hone to sharpness.

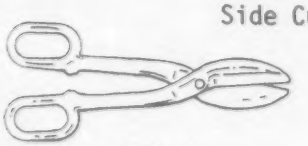
File



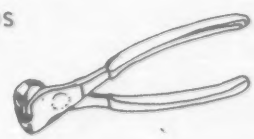
File Sections

Sureform Rasp

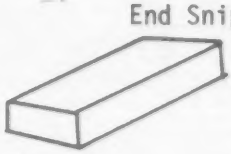
Side Cutters



Tin Snips



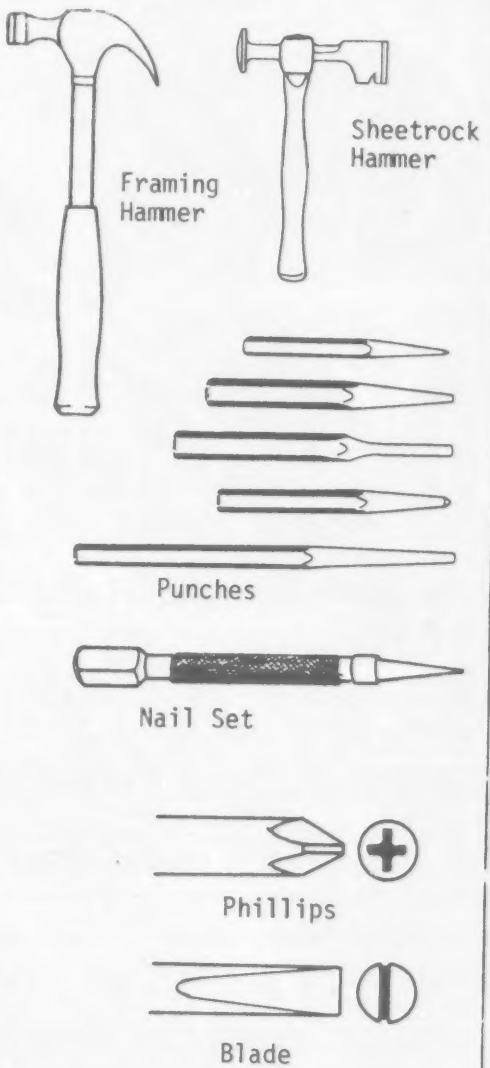
End Snips



Whetstone

C. Fastening Tools

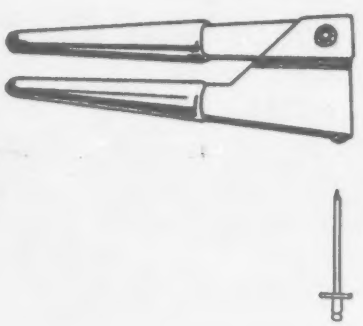
1. Hammers
   a. framing styles (12 to 20 oz. with claws) and sheetrock hammer (with blade and nail pulling slot).
   b. used to nail up drywall.
   c. hold near handle base, swing with forearm to drive nails.
2. Punches and nail sets
   a. punches and nail sets have various sized and shaped heads.
   b. used to mark or form holes and to recess nail heads below surface of material.
   c. select punch or set to fit nail, drive with hammer to desired depth.
3. Screwdrivers
   a. slotted and Phillips
   b. used to drive threaded fastening devices through drywall into backing.
   c. insert blade into slot of screwhead, rotate clockwise until completely driven.
4. Powder tool fastener
   a. gun-type tool used to drive fasteners into masonry/concrete; usually uses .22 cal. charges to "shoot" device into masonry.
   b. used to secure flooring, wall or ceiling tracks into masonry/concrete; used in place of drilling and using expansion type anchors.



c. mark location for anchor, load gun and shoot anchor. Use extreme caution and follow all manufacturers' instructions when using.

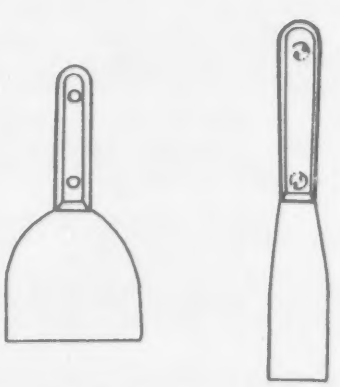
5. Stapler
   a. metal staple guns designed to drive 1/4" - 9/16" staples into various materials.
   b. used to attach insulation into suspended ceilings.
   c. hold material in place, press stapler onto material, squeeze to drive staple.

6. Pop riveter
   a. hand-driven riveting tool.
   b. used to fasten metal to metal, e.g. floor track and metal studs.
   c. drill hole into both pieces to be fastened, load rivet into tool, insert into hole and squeeze.



D. Rough Taping Tools

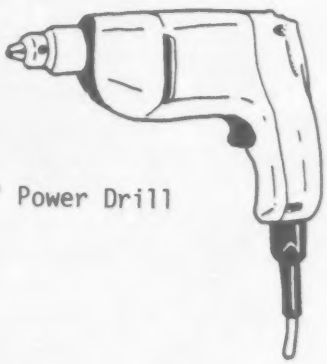
1. Taping knives
   a. 6" and 12" metal bladed knives.
   b. used to imbed tape into "mud" and to smooth and "feather" joint surface over seams in dry wall.
   c. after tape and compound have been placed over joint, put joint compound on 6" knife and draw downward over tape (compound should cover tape and extend over both sides of tape in a thin layer). After drying, process is repeated with 12" knife; should provide for a nearly invisible joint.



Taping Knives

E. Power Tools

1. Portable drills.
   a. generally three common sizes--1/4": high speed for light-duty applications; 3/8": more power, lower speed, used for heavier work; 1/2": more power, lower speed, used for heavier work.
   b. used not only to drill, but with attachments also to sand, polish, countersink, grind and drive screws.
   c. chuck speed (rotations per minute) will slow down considerably during drilling operation; select drill with enough power to do work or motor can overheat.
   d. drill bit is inserted into chuck by loosening chuck with chuck key, inserting bit then tightening chuck firmly.
   e. align and mark hole to be drilled, hold drill with both hands, one on handle, other on body for support.
2. Power screwdriver.
   a. specialty drill for driving fastening devices; reversible with some form of clutching device; chuck is designed to take various hex-shaped drivers.
   b. used to attach drywall with screws into metal stud work/gridwork for a fast and strong hold.



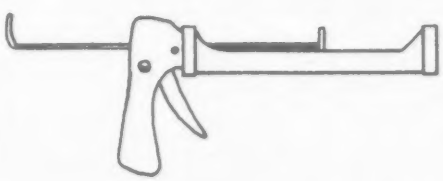
1/4" Power Drill

Screwdriver Drill Bit

c. screw is placed onto drive bit, with drill running or off; place screw tip at desired location; light pressure on drill will engage clutch or gearing and drive screw.

3. Radial arm saw.
   a. overhead track mounted circular saw; arm is adjustable-60^{o} right, left, and up and down. Cuts angles, bevels, rips and crosscuts. Size of blades range from 8" to 14".
   b. used to cut metal channels, angles and studs.
   c. using a metal cutting blade, mark location of cut, draw saw through stock toward operator.

F. Other Tools
   1. Caulking gun.
      a. pistol squeeze trigger, made of metal with either refillable or disposable cartridges.
      b. used for applying caulking and sealants to joints, cracks, etc.
      c. insert cartridge in gun and start squeezing until material starts to flow; move along joint, applying desired bead, squeezing trigger as needed.



   2. Tool/nail pouch.
      a. multi-pocketed leather and cloth composition; number and size of pockets varies.

b. used to store and carry tools and nails while working.

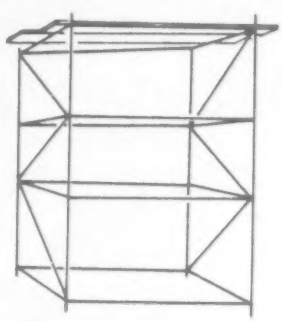
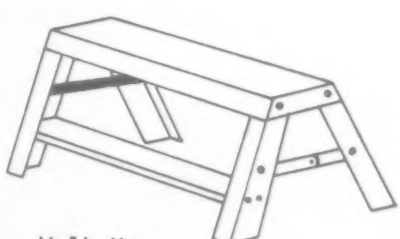
c. load with basic tools and supplies needed frequently during a job.

10.0 Equipment/Drywall

INSTRUCTIONAL OUTCOMES: The student will identify, select and describe the proper use of common drywall equipment.

INTRODUCTION: A skilled worker must be familiar with trade equipment in order to perform the task of hanging drywall. Frequently, tasks would be extremely difficult to perform without enlisting the aid of equipment.

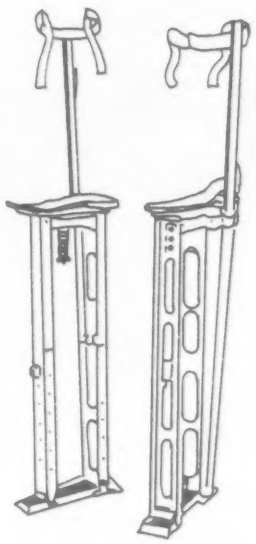
PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
10.1 Drywall Equipment A. Scaffolding 1. Metal/alloy modular platform structures assembled on site. May have metal or wooden planks for flooring. 2. Used to provide elevated work platforms to bring the worker into closer proximity to work. B. Walk up 1. Folding aluminum sawhorse with 12" wide top with adjustable legs. Height adjusts from 12" to 24" in 2" increments. Has side rail for step.	Explain and Discuss  Scaffolding  Walk Up

2. Used to stand on at various elevations while working.
3. Adjust leg length, unfold and stand on top surface.

Invite Supplier Rep to Demonstrate
Gypsum Association op.cit.

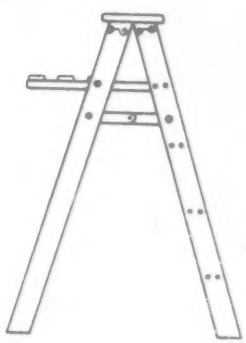
C. Stilts
   1. Most commonly metal alloy with height adjustments.
   2. Used to bring worker nearer ceiling height to aid in ceiling level work where moving around makes moving scaffolding awkward.
   3. Attached to workers' legs after height adjustments are made.



Stilts

D. Ladders
   1. Metal or wood construction, 6' to 20' extension types most commonly used; 6' to 8' step ladders also useful.
   2. Used for variety of climbing tasks.
   3. Extend to proper height, lean against wall, check for secure positioning and ascend.

Stepladder



E. Hoist and Rope
   1. Block and tackle with cord, either manually pulled or motorized.
   2. Used to lift material to scaffolding elevations to avoid carrying up on ladders.

Block and Tackle

3. Position and suspend pulley on scaffolding; attach load to rope and pull on other end until load reaches desired height.

F. Scissors Lift
   1. Gas or electric powered lifting device with minimum 4' X 8' surface lifting capacity.
   2. Used to lift drywall to elevations for upper wall and ceiling work; reduces lifting of material greatly.
   3. Drywall is placed on lift and moved upward to desired height.

G. Laser Level
   1. Low power industrial laser.
   2. Used to mark and check for level and plumb, expecially over long distances or where conventional means are either difficult or too time-consuming; extreme accuracy is possible with this tool.
   3. Machine is set at desired height and adjusted; beam of light will project true level.

H. Wire Hanging Pole
   1. Adjustable height extension pole made of metal alloy; length of extension varies with heights that must be reached.
   2. Used to hang suspension wire for hanging ceiling track.
   3. Wire is inserted into grip on pole and lifted to hangers in ceiling.

I. Electrical Extension Cords/Junction Boxes

1. Heavy duty 110 volt and 220 volt electrical cords; lengths 20' and up. Multiple outlet junction boxes with 2 or 4 outlets per box.
2. Used to provide electricity for power tools and equipment at various locations on job site.
3. Electrical loads and capacities dictate size and length of extension cord used; caution to avoid shocks is highly important; damaged electrical equipment is not used until repaired.

J. Sheetrock Lifter

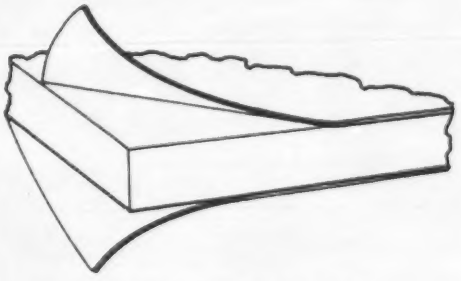
1. Mechanical lifting device, resting on floor and leaning against wall to lift drywall material.
2. Provides mechanical advantage in lifting drywall to elevated position.
3. Drywall is placed on lifter and hoisted to desired elevation.

11.0 Trade Materials/Drywall

INSTRUCTIONAL OUTCOMES: The student will identify, select and describe the characteristics and proper use of common drywall material.

INTRODUCTION: Walls provide more than a vertical flat surface; they are barriers to sound, heat and fire. Care must be taken to select the correct drywall materials and fasteners to insure proper performance of the finished product.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
11.1 General Materials A. Sheetrock (Gypsum) 1. Standard gypsum. a. gypsum material covered with paper on both sides comes in 4' widths, and sheet lengths from 8' and longer in 2' increments. Thicknesses from 1/4" to 1" are common. b. used often as interior wall surface in construction.	Explain and Discuss Invite Supplier Rep to Demonstrate Gypsum Association op.cit.  Standard Gypsum Board

c. provides sound, thermal and fire resistance to walls. Resistance increases with thickness of application. Building codes generally stipulate the "hour" fire resistance requirements for walls, which will dictate thickness of drywall used. Material is measured, cut and fastened with nails, screws or adhesives.

2. Water resistant gypsum.
   a. specially-treated gypsum drywall, designed to resist moisture. Available in similar dimensions as standard drywall material.
   b. used primarily in bathroom tub/shower enclosures; material is generally code required to insure moisture barrier between showers and framing material.
   c. applied as standard drywall but with more stringent nailing requirements and the use of special sealants; not used as final wall surface, but as subsurface to some other material such as tile.

11.2 Fasteners

A. Nails

1. Cupped-head metal nails, 1 3/8" to 2 1/4" in length.
2. Used to nail up drywall sheets over wood framing.

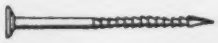
ILS "Fasteners"

3. Nails used 6" spacing over each stud must have head driven below surface in order to be covered by tape and joint compound.

B. Screws
   1. Pan head, metal, wood and S-12 screws, lengths 1" to 2 1/4".
   2. Used for attaching drywall to metal stud framing and metal framework assembly.
   3. Most often used with power screwdriver to speed up application; screws have more holding power than nails and thus resest popping out and cracking joints, but are more expensive and take more time to install.

C. Staples
   1. Metal sheetrock staples 1/3" to 2" in length.
   2. Used to attach drywall to framing.
   3. Applied with hand or pneumatic staple guns.

D. Pop Rivets
   1. Metal rivets come in wide assortment of sizes and legths.
   2. Used to attach metal parts in the assembly of sheetmetal framing.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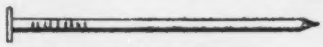
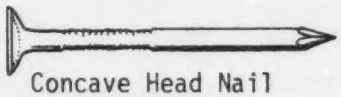
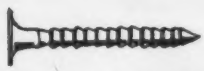
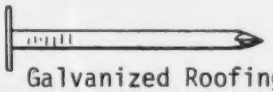
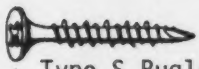

6 D Cooler Nail

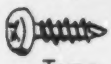

Concave Head Nail

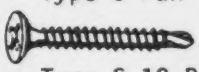
14 GA. Color Pin

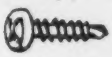

Flat Head Ratchet Nail

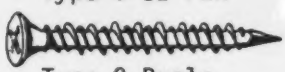

Galvanized Roofing Nail


Type S Bugle


Type S Pan


Type S 12 Bugle


Type S 12 Pan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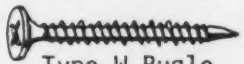
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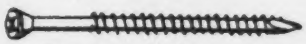
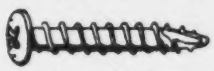
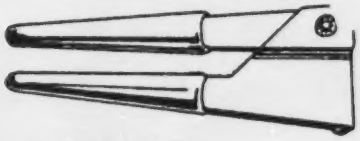
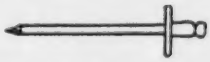

Type S Trim


No. 10 Base Screw

3. Pop rivet is selected, loaded in tool; rivet inserted into hole and handle is squeezed, compressing rivet head and securing work; can be used in "blind" situations where conventional rivets cannot be used.



Pop Rivet Gun



Pop Rivet

E. Powder-drive Fasteners.

1. Nails, pins, studs and other anchoring devices which come in many sizes and lengths.
2. Used in applications to masonry walls and floors--where volume of work dictates a faster means than drilling and using expansion shields, etc.
3. Applied with powder gun tool.

11.3 Sheet Metal Fabrications

A. Formed Sheet Metal Shapes (usually 25-gage cold formed galvanized metal)

1. Corner Bead.
2. U metal.
3. L metal.
4. Expansion joint.
5. Ceiling grid.
6. Resilient channel.
7. Metal Studs.
8. Furring channel.
9. T-channel grid components.
   a. used to assemble sheetmetal walls, ceiling grid work, and for forming joints on final sheetrock walls.

b. material is selected, cut to length and fastened together with nails, screws or pop rivets.

11.4 Insulation and Other Sheet Material

A. Other Sheet Material

Backing Board
Exterior Ceiling Board
Corkboard
Sound Deadening Board

1. Materials come in 2' X 4', 4' X 8' sheets and longer lengths in 4' widths. Thicknesses vary from 1/4" to 1".
2. Used to provide wall covering with different properties; often provide a subsurface on which final surface is attached.
3. Cut to size, nailed, stapled or glued into place.

B. Insulation Materials

1. Sound board.
   a. usually a fiberboard composition, comes in 4' X 8' and longer sheets.
   b. used to provide sound barriers between walls and in ceilings; often combined with double stud walls.
   c. measured, cut and nailed like drywall.

2. Foam sheet or fiberglass roll insulation.
   a. thickness and width depend on "R" factor requirements and stud/joist spacing.
   b. used to provide thermal protection in walls and ceilings; the thicker the layer the greater the barrier's capacity.
   c. cut to size, sheets are nailed or glued into place; roll is cut and either laid into ceiling space or stapled into wall cavities.

11.5 Sealants and Adhesive

A. Sealants
   1. Water resistant silicone based sealants, clear or colored.
   2. Used to seal joints in water resistant drywall.
   3. Often applied with caulking gun or squeezed from tube.

B. Adhesives
   1. Drywall adhesives.
   2. Used to provide superior bonding of drywall to framing members (i.e. over furring strips or masonry subwalls).
   3. Applied with caulking gun in a running bead.

11.6 Suspension Metal

A. Black Iron

1. Rod, channel and bar stock.
2. Used to form suspension hanging points for suspended grid ceilings.
3. Cut to length with hacksaw and secured in place with bolts or other anchors.

B. Hanger Wire

1. Heavy gauge wire (varies with load supported).
2. Used to suspend ceiling grid componants and facilitate leveling process for ceiling surface.
3. Cut to length, wire is attached to upper framing and grid Ts; length of wire is adjusted to provide level surface to ceiling.

12.0 Drywall Tasks

INSTRUCTIONAL OUTCOMES: The student will be able to identify and describe the steps involved in the various tasks in hanging drywall, from site preparation to rough taping.

INTRODUCTION: It is important that the skilled worker know the order in which a job is completed, as well as the individual steps of each task. Work is performed smoothly and more efficiently. Tasks are finished quicker with a greater sense of accomplishment and less frustration.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
12.1 General Tasks A. Site Preparation 1. Code inspection checks. a. job site should be checked to verify that all code inspections (i.e. electrical, framing and plumbing) have been checked off prior to beginning work. 2. Print and specification review. a. be sure to review both plans and specifications to insure that all materials and methods comply; note whether any changes have been made and/or approved.	Explain and Discuss Jobsite Visitation

3. Verify any changes.
   a. be sure that all changes have been approved.
4. Visual Inspection.
   a. walk job site to verify that it is ready for your job to begin. Check for level and square.
5. Inventory tools and materials for job to perform job and that sufficient materials are present or ordered to complete each day's tasks.

B. Interior Metal--Stud Wall Layout
   1. Floor tracks and openings.
      a. from plans or working drawings, measure and layout floor tracks and openings for doors and windows, using a steel tape and chalk line; care must be exercised.
      b. install floor track, using anchors (nails, screws or powder tool).
      c. mark ceiling track layout.
      d. install ceiling track using appropriate anchors.
      e. layout and install metal studs according to plans; use either precut studs or measure and cut studs to length before installation.
      f. measure, cut and install headers for doors and windows; sills for windows.

C. Hang Drywall

1. Measure surface and mark drywall.
   a. drywall hung horizontally provides a superior surface.
   b. use steel tape and 4' T-square to mark drywall. Extreme accuracy must be used in locating and marking any opening on sheet.
2. Cut each sheet according to marks.
   a. use utility knife and T-square as guide to "score" surface. Board can now be snapped.
   b. use special cutting tools (keyhole saw, circle cutter, etc.) when cutting any interior openings; exercise patience and care to provide clean and accurate cuts.
3. Fit drywall.
   a. be sure that correct fit has been achieved; drywall should fit close but not forced.
   b. if improper fit is not corrected, bowing may occur, leading to nail popping or other failures.
   c. retrim if necessary.
4. Fasten drywall into place.
   a. select fasteners to be used.
      (1) nails: generally used over wood framing, spaced 7" to 8" over supports (joists/studs).
         (a) nail from center out to prevent bowing of sheet and maximum draw to wall; nails at edge may not be less than 3/8" from edge;

nails should have between 3/4" and 7/8" penetration into framing member; wall thickness and penetration will dictate length of nail.

(2) Screws; generally used over metal studs.

(a) spacing is 12" o.c. (on center) in ceilings, 16" o.c. on walls where 16" o.c. stud spacing, 12" o.c. on walls where 24 o.c. stud spacing is used.

(b) for type S and G screws, penetration is 3/8" beyond drywall with 5/8" for type W over wood framing.

(3) staples.

(a) recommended only for applying base layer in multi-layered applications.

(b) use 16-gauge flattened galvanized wire with minimum 7/16"-wide crown and spreading points; minimum of 5/8" penetration should be provided.

b. fasteners must be driven below surface of drywall to be covered by joint compound and/or taping.

D. Installing Accoustical Ceilings

1. Determine ceiling height from plans.
2. Determine room layout, including openings in ceilings (e.g. light fixtures, etc.).
3. Measure and mark ceiling height on walls with chalk line; check with level.
4. Install wall angle with anchors or nails.
5. Hang wire from deck above with maximum 4' spacing; allow sufficient length for attaching grid Ts to finished ceiling height.
6. Set string for layout to act as guide and check reference.
7. Hang main Ts on maximum 4' centers, using hanger wire to attach and suspend.
8. Hang cross Ts (or furring channels with 16" center to center 1/2" gypsum)
9. Check for level and square.
10. Install grid panels into gridwork, or attach gypsum according to steps for hanging drywall.

E. Installing Insulation

1. Determine type and rating for insulation from plan specifications.
   a. sound insulation.
   b. thermal insulation.

2. Measure and cut insulation.
    a. care must be exercized to provide accurate, close fit or significant insulation effect will be lost.
3. Lay into place.
    a. may be secured with staples over wood framing.

F. Rough Taping/Finishing
1. Joints.
    a. flush and interior corner joints must be taped and covered with joint compound to provide smooth and seamless appearance.
2. Edge and corner trim.
    a. metal beading material is applied with specialized tools, then covered with joint compound and smoothed out.

SUGGESTED READING

1. Gypsum Association
Using Gypsum Board for Walls and Ceilings

Gypsum Association, 1970

2. Canada Employment and Immigration Commission
Interior Wall and Ceiling Finisher

Canada Employment and Immigration Commission, 1978

13.0 Basic Drywall Application Techniques

INSTRUCTIONAL OUTCOMES: Student will demonstrate and execute basic trade skills by completing a project to the satisfaction of the instructor.

INTRODUCTION: This instructional unit provides students an opportunity to practice techniques followed in the Pacific Northwest; appropriate techniques will have been learned in previous topics in this guide.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
13.1 Drywall Application to Wall and Ceiling Mock-up A. Preparation 1. Inspect wall for proper surface alignment. 2. Determine horizontal or vertical application. B. Layout 1. Note location and dimensions of outlets and wall openings.	Explain and Discuss Administer Project Sheet

C. Prepare Drywall
   1. Measure for sheet, start from corner.
   2. Transfer measurements to drywall sheet
   3. Mark sheet using chalk line, pencil and 4' T-square.

D. Cut prepared sheet to size using straight-edge and utility knife
   1. Break.

E. Applying Sheet to Wall
   1. Move sheet into place.
   2. Start first nail, drive partially.
   3. Check for plumb and square with level.
   4. Nail off rest of the sheet.
   5. Cut outlet holes (if required).
   6. Repeat steps 1-5 for successive sheets along wall.
   7. Repeat steps 1-6 for abutting wall(s), working away from corner.

F. Clean up jobsite when completed.

DRYWALL PROJECT SHEET

1. Applying drywall

The student will complet a drywall project, using tools correctly and safely, and to the level required by industry standards.

REQUIREMENTS

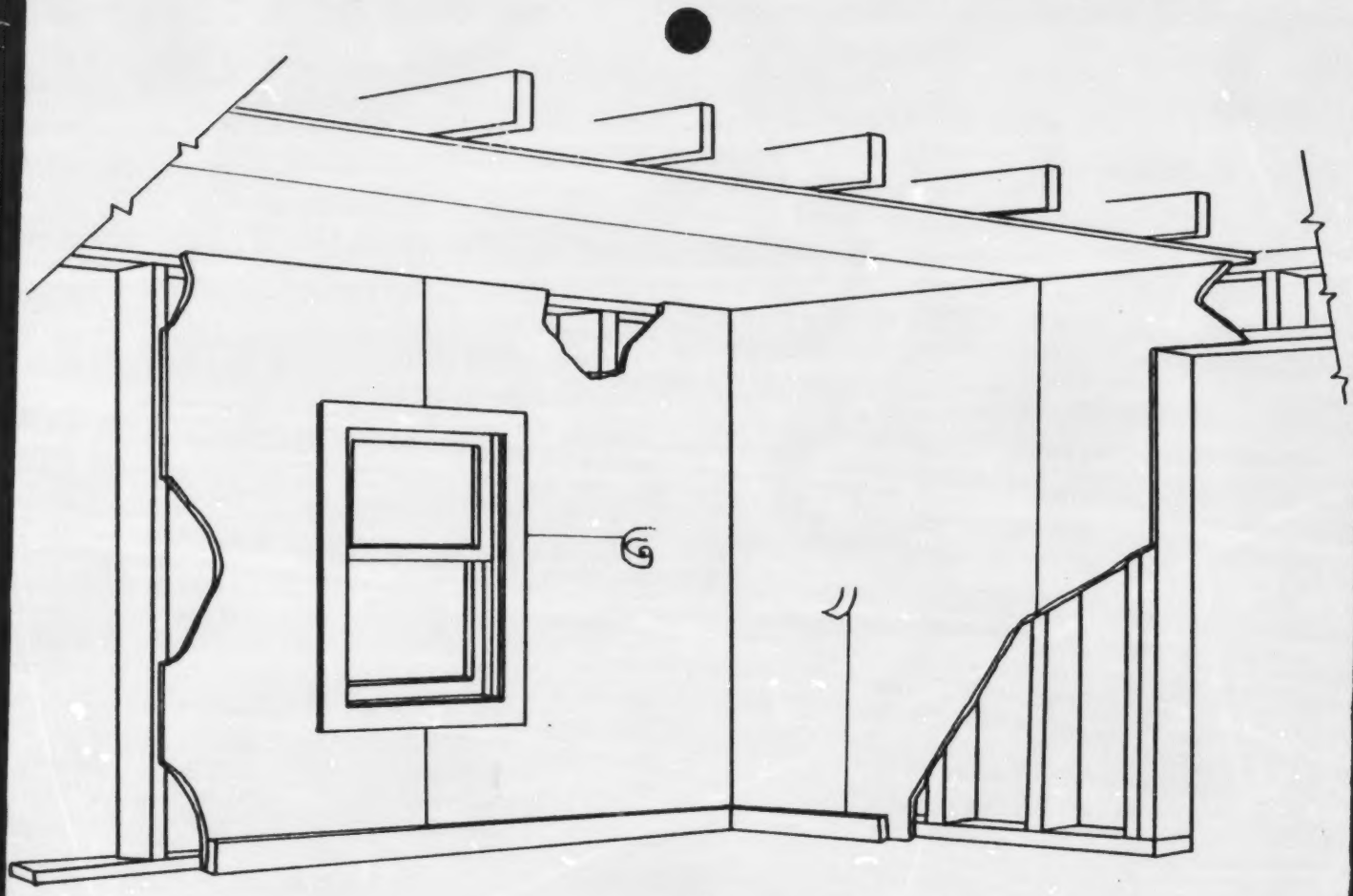
A stud wall (wood) 8' tall, with window opening, corner and electrical outlet receptacle box(es)

TOOLS

metal tape measure
pencil
chalkline
4' T-square
utility knife
hammer
drill
keyhole saw or sabre saw

MATERIALS

½" sheetrock, 4' x 8' sheets
1 3/8" (min.) sheetrock nails



DRYWALL MOCK-UP
CORNER WALLS WITH CEILING,
WINDOW AND DOOR OPENINGS

STEPS TO COMPLETION

1. Inspect wall for surface alignment (studs, sills, headers and plates must all meet with flush joints).

2. Determine whether to apply drywall horizontally or vertically (vertical application is easier, horizontal is stronger).

3. Note location and dimension of window and outlet openings.

4. Measure for first sheet. Start from corner and work away from corner.

5. Transfer measurements, mark and re-check measuring using 4' T-square and pencil or chalkline.

6. Cut sheet with utility knife, break.

7. (Before moving drywall you may desire to put reminder marks on floor to indicate stud location for nailing; use pencil.)

8. Move sheet into place.

9. Start nail; don't drive completely.

10. Check for plumb and square with level.

11. Drive first nail and nail off rest of sheet, 6" to 8" spacing on each stud. Omit nailing around electrical outlet(s) until opening is cut.

    Steps 12 through 15 used whenever outlet access is required.

12. Electrical outlet will protrude from stud work; mark outlet dimension on sheet.

13. Drill access hole for keyhole saw; be sure correct location is marked on drywall sheet.

14. Cut out rest of opening with keyhole saw or sabre saw.

15. Nail any ommitted nails.

16. Repeat steps 3 through 15 until first wall is completed.

17. Repeat steps 1 through 16 for abutting wall(s) always working away from corner.

18. Clean up.